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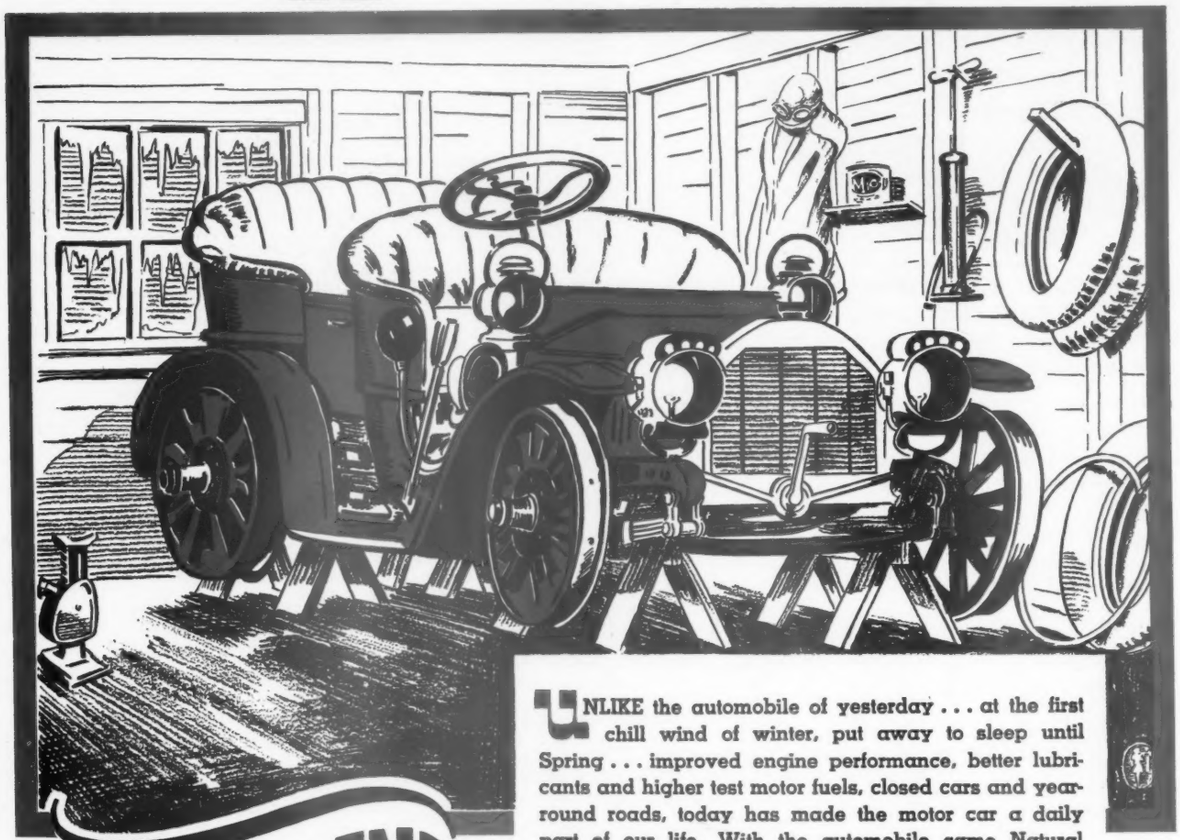
....and Winter came-1908



UNLIKE the automobile of yesterday . . . at the first chill wind of winter, put away to sleep until Spring . . . improved engine performance, better lubricants and higher test motor fuels, closed cars and year-round roads, today has made the motor car a daily part of our life. With the automobile came Natural Gasoline—an Industry small in the beginning, for the daily capacity of the first Hanlon plant built in 1908, was only a few barrels per day. Today Hanlon-Buchanan supplies domestic, coastwise and foreign markets with thousands of barrels of uniform high quality Stabilized Natural Gasoline.

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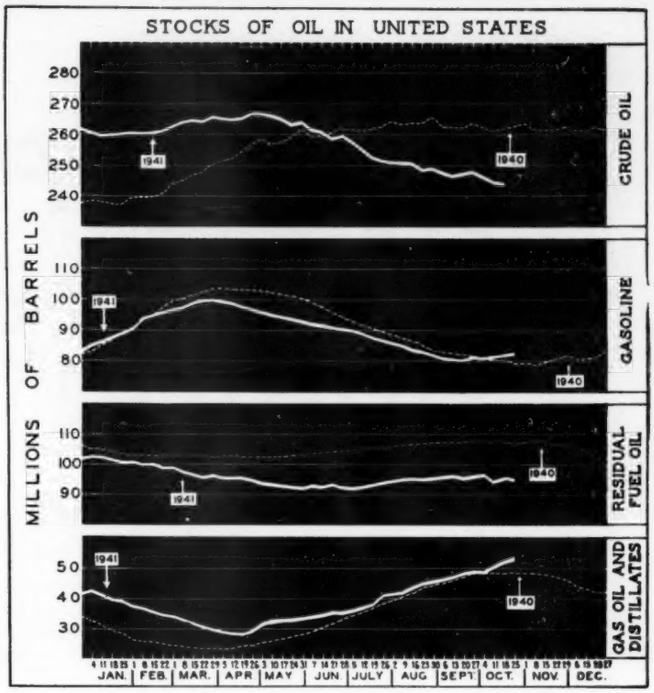
Trends

Return of Tankers Significant To All Operating Divisions



ALL branches of the petroleum industry the first of the week, were attempting to analyze the immediate and future significance to their operations of the scheduled return of 40 tankers by the British. Only those who have had the job in recent weeks of devising means of offsetting the loss of a substantial part of the coastwise transportation facilities have a full appreciation of what a return to normal operating conditions would mean to the entire industry.

CRUDE PRODUCTION *4,103,950 bbl. daily average—down 13,525 bbl. One year ago 3,643,955 bbl.*

CRUDE STOCKS *243,605,000 bbl. as of October 18—up 34,000 bbl. One year ago 262,098,000 bbl.*

GASOLINE STOCKS *83,343,000 bbl. as of October 25 — up 759,000 bbl. One year ago 79,800,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *95,295,000 bbl. as of October 25 — down 585,000 bbl. One year ago 107,123,000 bbl.*

GAS OIL AND DISTILLATES *53,183,000 bbl. as of October 25—up 780,000 bbl. One year ago 48,990,000 bbl.*

REFINERY RUNS *4,060,000 bbl. daily week ended October 25 — down 60,000 bbl. One year ago 3,565,000 bbl.*

*Includes 7,130,000 bbl. aviation motor fuel, down 106,000 bbl. One year ago 6,171,000 bbl.

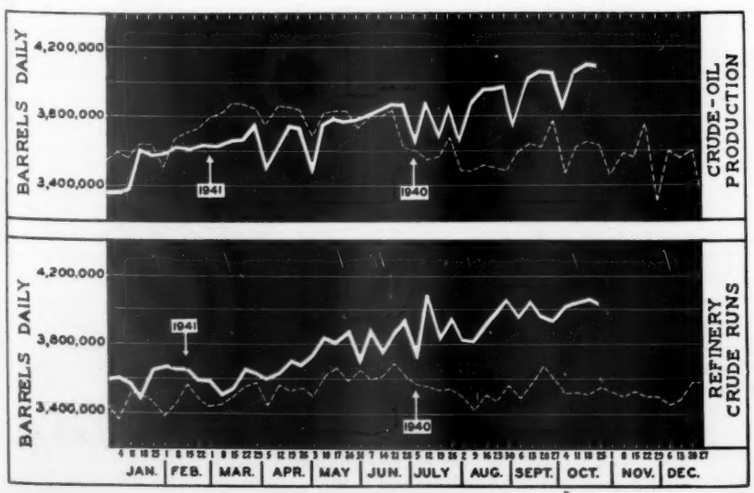
Discussions by those closest to this situation indicate that confusion exists as to what interpretation should be made of the plans to return the tankers. It has been explained that not all of the tankers to be returned by the British will be used in coastwise service. It is pointed out in this connection that Navy buying at the Gulf Coast and other points under the lend-lease provisions has increased recently with additional inquiries reported this week. It has been suggested that part of the tankers to be returned will be used in delivering increasing quantities of lease-lend material to be sent directly to foreign destinations under the convoy protection of the U. S. Navy, thus ending or reducing the necessity for a shuttle service to Canada where the British convoy service starts. This development could mean there would be little change in volume of tanker movements, the shift being in the manner of handling the shipments. Some support for this viewpoint comes from Washington where it was announced Tuesday that the domestic industry in the East must continue many of the makeshift transportation arrangements which have been used in getting petroleum to Atlantic seaboard consumers.

Most observers, however, are confident that the next few weeks will bring a steady return to more normal transportation conditions. This development will be particularly important to those who are participating in the costly large-scale movement of crude oil and products by tank car. The return of tankers will also end the threat that the shipments of eastern gasoline lines would have to be reversed shortly in order to transport crude oil and products originating in the Middle West and the Mid-Continent to the seaboard. A gradual shifting of the emergency northern and eastern overland shipments to the normal southbound movement to Gulf terminals and refineries will also simplify many operating problems of refiners and pipe-line owners in all parts of the oil country.

It is also predicted that major pipe-line construction which has been under consideration as a result of the requisitioning of tankers and which could not be justified on a basis of comparative transportation costs and peacetime needs, will be postponed indefinitely.

DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 25, 1941	Bur. Mines Oct. est. of demand	October state allowables	Oct. 18, 1941
Arkansas	71,945	78,200	73,400	71,845
California	643,750	613,200	613,200	664,150
Eastern fields	113,650	118,200	.....	113,500
Illinois	420,430	399,200	.....	420,615
Kansas	255,500	253,000	256,500	259,800
Louisiana	344,695	332,000	339,233	345,505
North Louisiana	*81,295*	.....	.....	*80,155*
Louisiana Gulf Coast	*263,400*	.....	.....	*265,350*
Michigan	58,620	44,100	48,000	57,800
Mississippi	66,400	43,900	.....	64,130
Nebraska	7,000	5,300	.....	7,200
New Mexico	116,420	114,600	114,000	115,840
Oklahoma	425,450	481,500	428,000	418,250
Rocky Mountain states	111,390	109,600	.....	113,140
Texas	1,468,700	1,420,100	1,485,966	1,465,700
East Texas	*369,700*	.....	.....	*369,900*
West Texas	*283,700*	.....	.....	*282,850*
North Central Texas	*136,750*	.....	.....	*135,750*
East Central Texas	*85,700*	.....	.....	*85,450*
Texas Panhandle	*79,450*	.....	.....	*80,400*
Texas Gulf Coast	*417,500*	.....	.....	*415,400*
Southwest Texas	*95,900*	.....	.....	*95,950*
Total United States	4,103,950	4,012,900	.....	4,117,475
Total production, Jan. 1-Oct. 25, 1941		1,120,948,620 bbl.		
Same period last year		1,104,845,065 bbl.		



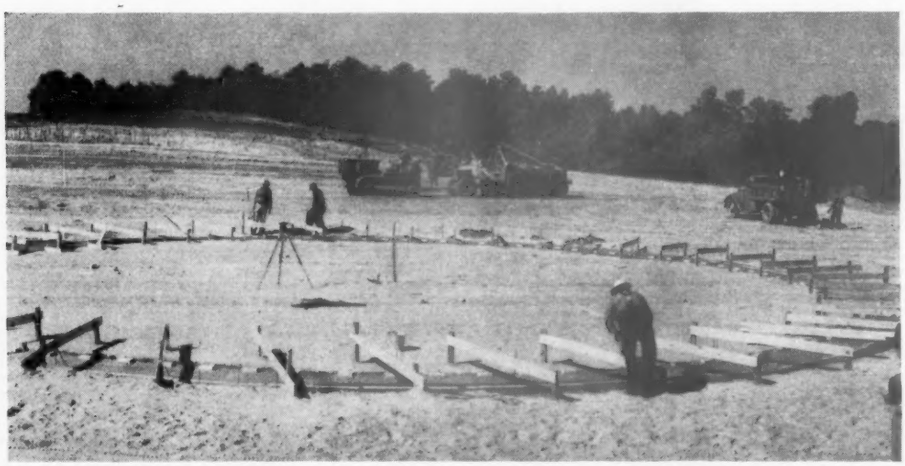
Plantation Pipe-Line Project Pushed for Early Completion

By PAUL REED

ATLANTA, Ga., Oct. 27.—Construction of Plantation Pipe Line Co.'s pipe line—the industry's largest project of 1941—is progressing steadily and it appears that this great undertaking will be completed by the first of the year. The rapid rate at which work is being done means that requirements of schedules are met in accordance with the most optimistic expectations when plans for the line were discussed this spring.

Already 341 miles of 12-in. pipe has been shipped from the mills; of this 246 miles has been strung on the right-of-way and 224 miles has been completed. Of the 10-in. pipe for the project, 356 miles has been shipped and is on the ground, 145 miles has been strung and 90 miles has been laid. All of the 12-in. will be on the job the first week in November. River pipe and casing for highway and railroad crossings have been received. Crossings at all of the principal rivers will be laid and out of the way before the period of high water. Four-inch and 8-in. are being received.

The work of building this gasoline system which consists of main line and laterals in the area between Baton Rouge, La., and Greensboro, N. C., is being pushed by 10 gangs now in the field. Plantation Pipe Line Co. is owned by the following organizations: Standard Oil Co. of New Jersey, Standard Oil Co. of Kentucky, and by Shell Union Oil Corp.



Construction of tank foundation and grading where terminal facilities are being constructed at Doraville, Ga., for the storage and transshipment of refined products to be received at this point when the Plantation pipe line is completed and in operation

Plans for the line call for the laying of 432 miles of 12-in., 356 miles of 10-in., 196 miles of 8-in., 255 miles of 4-in. for the main system. Four parallel 12-in. lines, 6 miles in length, are to be laid from dock facilities on the Mississippi River to the first main-line pump station near Baton Rouge. The system will have 16 pump stations.

Plantation Pipe Line Co. will be capable of moving 60,000 bbl. daily from Baton Rouge, La., to the junction point of Bremen, Ga. By doubling the number of pump stations in this section, it will be possible to increase capacity to 90,000 bbl. per day. The main line from Bremen to Greensboro., N. C., will have a capacity of 42,500 bbl. per day. Refined products will be withdrawn at the various terminals all along the line. The system has been designed as a "level line" in order that it may be prepared to meet large demands in the future which may be made by the defense program in the area served.

By December 15 all of the 127,500 tons of pipe required for construction, with the exception of 1,200 tons, will have been provided. Great as this steel tonnage appears to be in comparison with that of other pipe-line projects built so far this year, it is said to represent less than half a day's output for the steel industry's normal operation.

The Plantation Pipe Line Co.'s activities are directed by C. R. Younts, president, who has been an executive in the marketing division of Standard Oil Co. of New Jersey. Construction and operation of the system are in the hands of F. E. Warterfield, Jr., formerly chief engineer, Oklahoma Pipe Line Co. He is assisted by executives and engineers who have been assigned to the Plantation staff by partner companies and industrial organizations. Ford, Bacon & Davis, Inc., acts as agent and handles the supervision of field construction and assists with the engineering work of the project.

In the period since C. R. Younts and F. E. Warterfield, Jr., came to Atlanta to look for office space on May 13 of this year, 98 per cent of the right-of-way between Baton Rouge, La., and Greensboro, N. C., has been acquired. The project has proceeded with friendly cooperation on the part of rural and urban residents. The federal Government has cleared the way of legal obstructions by authorizing the company to acquire right-of-way by the exercise of the right of eminent domain, but to date this right has not been used. Agreements have already been signed for 51 of the 92 railroad crossings and negotiations are being carried on for the remainder. The project has had ready cooperation of Petroleum Coordinator Ickes, OPM and War Department, which has been prompt in granting permits for stream and river crossings.

Transportation requirements basically call for handling three grades of motor fuels, kerosene and burning oils. The complex nature of dispatching shipments is indicated by the fact that under operating conditions there may be as many as 16 products in the line at one time, which are destined for 17 different terminals. The line and pumping stations are to be owned and operated by the Plantation organization. Terminals will be operated by the shippers and each is providing tankage and terminal facilities.

Line Serves Large Area

The receiving point on the line is near Standard Oil Co. of Louisiana's refinery at Baton Rouge, La. Nearby dock facilities will handle shipments coming by river from shippers using the line. Normal capacity of the line, if used wholly as a gasoline carrier, will be sufficient to transport about 50 per cent of the gasoline requirements of the states of Mississippi, Alabama, Georgia, South Carolina and North Carolina.

This area supports 16,251,000 people, or 12.34 per cent of the total population.

There are approximately 2,300,000 trucks, buses, passenger automobiles and farm tractors in this area. Considering population, number of automobiles, trucks, and tractors, industries and the value of their products, the region represents 9 to 12 per cent of the United States.

The territory which will be served by the Plantation system is also important in the rearmament program, since it contains 30 airports suitable for military aircraft and 18 large Army camps, completed or in process of construction. Of the U. S. Army's requirements for the first half of 1941 for aviation gasoline, 17 per cent is for points in the area to be served by the pipe line. These requirements will be increased with the expansion of the defense program, Army maneuvers and aviation training.

To correct a misunderstanding regarding the types of transportation with which the line competes and to indicate what types of transportation it relieves, it has been pointed out that 89 per cent of the total volume of products which the line would transport now moves either wholly or in part by ocean tanker or barge. Only 11 per cent moves by rail. Along the coast there is a zone which can be served most economically by tankers. Between this tanker zone and the area to be served by the pipe line, is a marginal or border-line zone where the two forms of transportation will be in competition.

The principal cities near which terminals will be located are: Baton Rouge, La.; Birmingham, Ala.; Montgomery, Ala.; Bremen, Ga.; Columbus, Ga.; Chattanooga, Tenn.; Knoxville, Tenn.; Atlanta, Ga.; Macon, Ga.; Athens, Ga.; Belton, S. C.; Spartanburg, S. C.; Charlotte, N. C., and Greensboro, N. C.

The Paradox Of Proration

By ROBERT E. ALLEN
OPC Director of Production

In this paper the author discusses the complicated problem of proration in relation to conservation practices and to the necessity of finding more oil reserves, the need of which has been emphasized by the ever enlarging requirements of the present defense emergency.

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ROBERT E. ALLEN

DURING the past 10 years the oil producers of the production-controlled fields of the United States have become increasingly aware of a situation that has appeared to make "curtailment self-perpetuating" as many operators have expressed the idea. In some districts this situation has resulted in the peculiar but entirely understandable phenomenon of greater and greater production restriction even in the face of declining reserves and increasing demand. When the rate at which reserves are made accessible by drilling exceeds the rate at which reserves are being depleted by production this condition will occur and it is aggravated in the extreme if the respective rates of development and depletion are wrongly, but commonly permitted to be influenced or measured by the indicated current total productivity or the so-called potential in some one of its myriad forms.

It is now well established that the maintenance of pressure in an oil deposit acts to maintain the current productivity of the wells producing from that deposit, irrespective of whether such maintenance be by the strictly conservative use of the natural forces of the reservoir or by the progressive and continuous restoration of fluid to the reservoir. The conservation of petroleum resources, therefore, leads in varying degree to the apparent maintenance of the productive ability of developed reserves, while the equally necessary development of new reserves, to offset depletion, has the result of increasing the productive ability to a degree that may bring about a seemingly intolerable limitation of current production and a remarkable prolonging of the life of wells and fields. This is the paradox of proration and represents the most perplexing conundrum of conservation as now generally practiced.

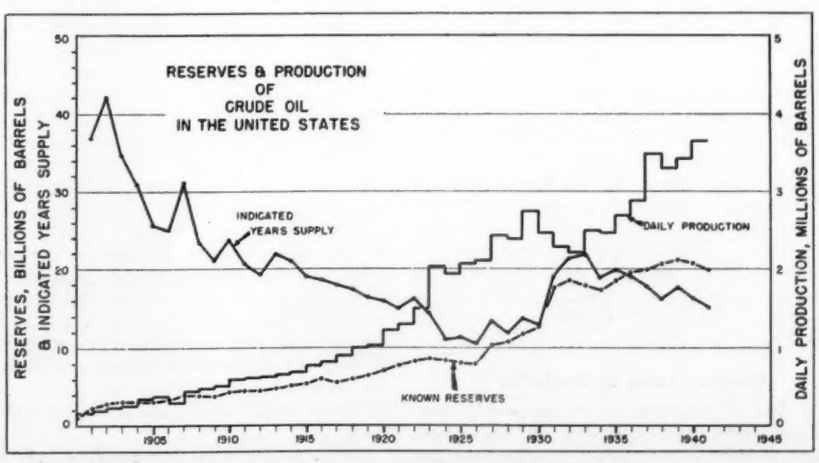
Curtailment and Conservation Relation

Under rigorous conservation control, which of course includes pressure maintenance either by natural or artificial means, the current productivity or potential for many fields does not decline at any rate proportionate to the depletion of petroleum from the reservoir, and this is particularly true for fields that have had their flowing life extended far beyond the expectations of previous practices. Equally true is the fact that the flush production of a well or group of wells does not provide a sound measure of the recoverable oil content of the reservoir although such flush production does provide the owners of the wells with a strong argument for its use as an important factor in the allocation of initial production quotas, and this is particularly true when the argument is backed by the pressure of excessive-promoted capital that has contributed to the drilling enterprise.

How then may the older wells of a state or district be "moved over" to provide for the entry of the new wells that must constantly be drilled to offset depletion, to maintain efficient operation and conservation, and thus to aid national defense? This question expresses the paradox of proration in conundrum form. The purpose of this discussion is to survey and approach the problem rather than to propose a positive answer which might be debated as long as conservation can continue.

The economics of petroleum production in any particular field or district may be best considered objectively if the field or district is thought of as a single economic unit as indeed it is from a national perspective. Since the paradox of proration involves directly but oppositely the depletion of old wells and fields and the accretion of new wells and fields it is apparent that the answer to the conundrum of conservation must be sought by equating the rate at which developed reserves should be or are being depleted against the rate at which new reserves are being or should be discovered and developed. This in itself is no simple problem as is attested by the host of studies that have been made and published on various phases of these subjects. Most of these articles have dealt with the economics of development, well spacing, rate of drilling and the like, but the literature concerning the optimum or proper rate at which any given reserve should be produced or depleted is as scarce as the subject is important.

Since the proper rate of depletion is both the determinant of the proper rate of discovery and development and the index of the efficacy and degree of conservation, it is only logical that it should be first considered in this general approach to the problem. In this consideration it is well to preliminarily review the distinction between conservation and proration because although their frequently identical effect has resulted in a tendency to consider the terms synonymous. It is well to remember that the one is an objective or end to be attained, the other is merely one of the means occasionally employed in the attainment of that end. The writer believes with Collom, that "conservation is efficient production without avoidable waste for beneficial use." On the other hand, one of the most prevalent of many definitions says that "proration is distribution of some total quota to a number of participating units in proportion to one



Production of crude oil plotted against indicated years' supply and known petroleum reserves showing need for more intensive exploration and exploitation

W. R. BOYD, JR.

Man of the week: W. R. Boyd, Jr., Teague, Tex., executive vice president of the American Petroleum Institute for many years, was elected president of the Institute October 24 to fill the unexpired term of Axtell J. Byles who died September 28. Mr. Boyd was elevated to the top office in the Institute by the executive committee which met in New York last Friday. The new president joined the A.P.I. staff in 1920, shortly after its organization. Before joining the A.P.I., Mr. Boyd had been national manager of the League to Enforce Peace from 1915-19 and in the previous 8 years had been connected with various banking institutions and served 1 year as secretary to a Texas congressman.

This Week...

Restrictions on East Coast petroleum operations ended abruptly with British promises to return 25 additional American tankers by November 30. Fifteen other tankers are being removed from British shuttle service, making a total of 40 turned back, about half of the total originally requisitioned. Dropped is the service-station curfew, rationing and ban on gasoline egress from District 1.

●

Prices: Firm at generally unchanged levels. OPA studying data supporting request of Phillips for authority to raise Mid-Continent crude 25 cents. Studying Pennsylvania evidence submitted in justification of higher postings. Recognized by OPC as important factor in stimulating exploration.

●

Priorities: OPM and OPC continue work on industry-wide allocation program covering materials for exploration, production and refining. OPM opening more district offices to advise and aid consumers. OPC issues set of practical suggestions.

●

Members of District 5's production committee have conservation plan in Washington, D. C., where it is under study by OPC. No action anticipated until A.P.I. meeting in San Francisco, Calif., next week is over.

●

Speculation in Washington, D. C., is that findings of Edward W. Pauley, the California democratic committeeman and friend of President Roosevelt, who was sent to London by Coordinator Ickes to study the British petroleum supply situation, had considerable influence in return of American tankers.

CIO and its affiliate, Oil Workers International Union, formulate plans for intensive efforts to unionize 500,000 nonunion oil workers. War chest of $200,000 provided to launch drive in Standard companies.

●

Ten flowing wells in the Dominguez (California) field were killed by earth tremors on the Pacific Coast October 21 and 22.

●

Coordinator Ickes reported East Coast situation much improved. Total stocks of all oils in that district were 63,927,000 bbl. on October 18, being 2,399,000 bbl. higher than October 11 and only 476,000 bbl. less than a year ago.

●

Caracas Petroleum, S. A., Venezuelan subsidiary of Ultramar Co., Ltd., is reported to have discovered a new producing area in the central part of the State of Guarico, 90 miles west of the nearest commercial production.

●

Completion of Shell Oil Co. Inc.'s 83-mile pipe line linking California's coastal fields with the company's Wilmington refinery obviates the need for two tankers.

●

Operators completed 705 wells in the week ended October 25, making the third week this year that this figure has exceeded the 700-mark. In 2 previous weeks, those ended August 23 and October 9, completions in each totaled 715.

or more factors common to all the units." It will be noted that this definition has departed somewhat from the early concept of a purely arithmetical distribution of allotments on the basis of proportional productivity, but it must be remembered that the procedure of production allocation has also quite properly departed a long way from the simple proration of potential.

In previous expressions on this subject, the writer, with others, has shown that although proration for whatever purpose, frequently results in conservation as somewhat of a byproduct, this result is neither necessarily nor invariably achieved. For instance, any form of proration that encourages or does not definitely discourage the drilling of unnecessary wells may easily result in underground waste rather than in conservation. In this connection it is well to remember that conservation of capital in petroleum development is frequently as important as the conservation of petroleum itself, for the history of oil-field development shows only too clearly that the waste of capital and the pressure for its partial recovery almost always results in improvident production with its attendant waste. It may be noted also that in time of emergency or during a period of material or labor shortage, the conservation of both may become more essential than the conservation of the capital required for their purchase.

Efficient Rates of Depletion

The rate of depletion of an oil reserve may vary anywhere from the ideal to the actual. Neither of these is susceptible of immediate precise determination but both may be estimated within reasonable limits, particularly after some measure of the magnitude of the reserve is available. The actual rate of depletion depends upon the annual rate of production, and it may be properly thought of as being composed of the percentage of the economically recoverable-ultimate production actually produced during the year plus the percentage of originally recoverable oil that the method and rate of withdrawal may have rendered economically unrecoverable during the year. Oil that is forever sequestered underground as the result of inefficient production practices represents depletion just as much as oil actually produced and sold. The magnitude of the hidden and unprofitable depletion is illustrated by one field known to the writer that produced 35 per cent of its indicated recoverable ultimate during its first year of flush production, while subsequent history showed that at least 25 per cent of the original recoverable content had been rendered economically unrecoverable by the production orgy of the first year. Illustrations of this kind are fortunately becoming less numerous as the general efficiency of the petroleum industry advances.

What constitutes an efficient rate of depletion has been quantitatively unknown until recent years. Lately, analysis of the production performance of rigorously controlled fields like Sugarland, East Texas, Conroe, Yates, Ten Section, West Coyote, Rio Bravo, South Burbank and others have yielded more than a clue to at least the outer limits of the range of efficient rates of depletion for different fields as a general proposition.

The ideal rate of reserve depletion may not be considered as exactly determinable in advance. However, it is now possible to compute the maximum limits of the range of rates at which different types of reservoirs and wells may be efficiently depleted. It is interesting to note that by definition the ideal rate of depletion which is "the rate that most efficiently utilizes the energy of the field in obtaining the greatest economic recovery" is identical in meaning with the definition of the "optimum rate of production" which, after Pogue, is "that rate which minimizes, per unit of production, the development of pressure differentials or declines, the release of gas from solution in the reservoir, the shifting of the gas cap, retrograde condensation in the reservoir, irregular intrusion and encroachment of water, and results in maximum economic recovery." Therefore, the ideal rate of depletion will hereinafter be used synonymously with the optimum rate of production, although the one is usually thought of as a percentage of the recoverable ultimate while the other is usually expressed either as a volume or mass rate of reservoir withdrawal per unit of time.

Tolerance for Inefficiency Needed

The optimum rate of production or the ideal rate of depletion for a given field is probably a function principally of the permeability and the structural nature of the reservoir, and hence may be gaged to some extent by reference to the mean-productivity index of the reservoir. In considering production efficiency, some reasonable tolerance for underground waste and inefficiency must be established. If this tolerance is taken as a conventional 5 per cent of the economic ultimate then it may be stated that even in the case of the more permeable reservoirs experience indi-

(Continued on Page 195)

Engineers Foresee Standardization Of Fuels and Lubricants

By W. T. ZIEGENHAIN

THE oil industry today is an outstanding example of war preparedness," was one statement oil men were interested in hearing as A. T. Colwell, president of the Society of Automotive Engineers, addressed the annual meeting of the Fuels and Lubricants division of the society in a 2-day meeting which closed at Tulsa Friday. Of course, the program of papers dealt more specifically with problems of correlating gasoline and lubricant specifications to motor-car needs but the influence of the nation's preparedness program permeated all discussion.

R. C. Alden, director of research for the Phillips Petroleum Co., showed how this could be made more effective on fuels by use of the Sligh equilibrium air-distillation apparatus. The principle used is not new, according to Mr. Alden, but his company's adaptation of it is unique. As a result the author indicated that many road tests now conducted to determine the suitability of fuels for actual performance would not need to be made but could be replaced by this method of testing the fuel in the laboratory. Diesel-engine operation and motor-lubricating problems came up for discussion in papers presented by W. G. Ainsley, of the Sinclair Refining Co.; H. F. Brinnen, of Young Radiator Co.; F. A. Suess, of Continental Oil Co.; Ulric Bray; and H. L. Hemmingway, of Kendall Refining Co. Unusual care in developing each subject was revealed by the man presenting the paper and most of the papers were the products of joint endeavors among several which added to the effectiveness of the ideas expressed.

On the subject of diesel fuels Mr. Ainsley outlined the difficulties of engine builders and refiners in getting together on a common understanding of what fuels can be supplied in sufficient volume and at costs which best suit their common customer. In part, he said: "The refiner has problems beyond his control which limit his ability to meet, economically, a wide variety of diesel-fuel specifications. If the diesel-engine user is to continue to enjoy low-cost fuel, and if the difficulties traceable to the wide variation in the fuels now supplied by the different refiners are to be eliminated, then we must ask for a fuel which will satisfy the refiner as well as the consumer and which will meet the requirements of the commercial diesel engines now in use." It was with this thought that the following specifications were suggested for use by the A.S.T.M.:

Flash, min., °F.	140
Pour, max., °F.	*20
B.s. and w., max., per cent	0.05
Carbon residue (10 per cent bottoms), max., per cent	0.20
Ash, max., per cent	0.01
A.S.T.M. distillation:	
90 per cent point, max., °F.	650
End point, max., °F.	700
Viscosity:	
Kinematic (centistokes)	2.0 min., to 6.0 max.
Saybolt (S.S.U.)	32.6 min., to 45.5 max.
Sulfur, max., per cent	1.0
Corrosion	Pass
Alkali and mineral acid	None
Cetane number, min.	45.0

*Lower pour points may be specified whenever required by local temperature conditions to facilitate storage and use. When operations are anticipated at atmospheric temperatures below an average daily minimum of 10° F., lowering the pour point may also require a lowering of the minimum viscosity limit.

Turning then to a discussion of modern lubricants, H. L. Hemmingway, Kendall Refining Co., described the results his company had secured when using a laboratory engine of its own design to determine the stability of oils or their resistance to oxidation. He advocated engine tests and offered the following conclusions based upon the engine tests he had conducted:

1. The engine-ratings system provides a "third dimension" to the usual test-engine photographs.

2. Test-engine ratings made by different teams check each other with surprising accuracy.

3. A fair degree of correlation is shown between the naphtha insolubles of 10-hour Underwood oxidation samples (with soluble iron catalyst added) and the dirtiness ratings of the same oils in 4,000-mile oil-stability tests.

4. Reasonably good correlation is shown between laboratory-test engines on 4,000-mile oil-stability tests and 6,000-mile field tests, but

(*a*) The spread between the best and the worst oils in the laboratory-test engine is greater than the spread between the same oils in field-test engines.

(*b*) Above an intermediate engine dirtiness condition (35 demerits), the laboratory-test engine on a given oil is dirtier than the road-test engine, but below that point the reverse is true.

5. The engine-ratings system is quite indispensable in a proper study of oil-stability improvement.

6. The effect of additional detergency is readily evaluated by the use of an engine-rating system.

7. The rating system has been extremely valuable for the training of field engineers and laboratory technicians in the correct procedure for complete engine inspection.

Additives in Lubricants

Frank A. Suess, Continental Oil Co., in presenting a paper prepared jointly by himself, W. A. Jones, H. C. Baldwin, and Bert H. Lincoln of the same company, stressed the value of additives in motor lubricants and based their conclusions upon actual road tests using five types of oil in several types of new model cars. Their conclusions, in part, were:

"There is still considerable room for debate as to the optimum degree of peptizing or detergency desired in an oil. The minimum change in oil characteristics in service is most imperative along with enough peptizing to prevent excessive deposition of materials of either intrinsic or extrinsic origin. The evidence certainly indicates the desirability of preventing the formation of products of oil change rather than permitting their formation and causing them to be dissolved in the oil, since such oil-soluble products result in accelerated rates of oil change due to their catalytic effect.

"Since it has been shown that the road-test units displayed higher rates of oil change even though they had lower operating temperatures, it appears that the catalytic effect of oil deterioration residues left in the engines at oil-change periods is of greater magnitude than is generally recognized; and it is doubtful if increased engine-stand oil temperature can be satisfactorily substituted for this effect.

"This series of tests indicates the indispensability of a variety of equipment in oil testing and the futility of hope that a single piece of equipment may be developed which will quickly and correctly evaluate lubricating oils."

Refining companies were well represented among the speakers and session chairmen appearing before the S.A.E. Fuels and Lubricants meeting. Above are, (standing): Ulric Bray, consultant; G. C. Richardson, Cities Service Oil Co.; R. C. Alden, Phillips Petroleum Co.; A. E. Smith, Jr., Merz Engineering; Frank A. Suess, Continental Oil Co. (Seated) W. G. Ainsley, Sinclair Refininng Co.; C. S. Hansen, Phillips Petroleum Co., and A. L. Heintze, Sinclair Refining Co.

Operating Data Give Facts On Industry's Supply Needs

By H. STANLEY NORMAN

FACTUAL data on operating requirements now weighing on the petroleum industry speak more eloquently than all the oratorical masters available on the need for a priority position second to armaments only, if the oil business is to fulfill its existing and potential responsibilities.

The industry is just now entering the era of demand for 4,000,000 bbl. of domestic crude daily. The transition from a demand for 3,629,800 bbl. daily, the rate in 1940, to that now existing has been unprecedently abrupt. Even through August the last month for which official Bureau of Mines statistics are available, the demand for domestic crude oil was only 3,797,300 bbl. daily, revealing that nearly 250,000 bbl. of the daily demand has developed during the past 2 months.

Promptness with which the industry met its increased responsibilities during the first impact of the emergency demand is complete confirmation of previous claims that it was fully prepared to meet all conceivable requirements. There were no excessive claims from any responsible faction in the oil industry that emergency and civilian demands could be met. Assertions of complete preparedness on the part of the industry were based, however, on the assumption that a continuous flow of supplies could be maintained as a fundamental prerequisite in meeting the obligations of production. Claims that the industry had ample crude reserves, sufficient refining capacity and adequate transportation facilities were predicated on forecasts of petroleum demand and have been vindicated by every gage. Still, the continued ability to do the things the industry said it could do 6 months ago is contingent upon receipt of tools without which the oil business would be reduced to impotency.

Key factors in the industry's qualifications for supplying the current high demand and an increase of 7 per cent next year, the figure now forecast by conservative petroleum economists, are rate of drilling, refining capacity and production. The latter is intimately related to the first of the three factors and each is dependent on the other. The accompanying charts indicate that the rate of well completions is probably more intimately related to the price of crude oil. Still, the normal association of prices and the rate of well completions is indirectly related to demand for petroleum. There is not the constant relationship between rate of completions and demand that the former bears to prices. But, it follows that an incline in the demand curve normally causes posted prices to increase, the time factor being governed by abruptness. Consequently, the incline of demand is the basic cause for increases in drilling although the upward pressure is actually transmitted through the inducement of higher prices.

Well completions in the United States reached new peaks during July, August and September, but deficiencies in this phase of operations during the earlier months of the year make it doubtful that the 1941 total will much more than equal the figure of 32,560 chalked up in 1937. Average monthly completions for the first 10 months this year are about on a par with the 1940 total. Still, the accelerated pace of drilling activity for the last 6 months will raise the monthly average completion coordinate to around the 2,720 mark, nearly 200 above the level prevailing at the end of September. This year's completion curve reached a 9-month peak in July when 3,165 wells were finaled. The rate dipped in August and September, possibly a reflection of the restrictions on distribution of drilling equipment resulting from the defense program. An adjustment in September completions places the total at 3,073, slightly higher than shown on the chart, but operators resorted to all the ingenuity for which they are noted in maintaining the pace.

Here's one reason motor-fuel consumption has risen this year and will continue upward in 1942. Approximately 161,000 gal. of gasoline are required to refuel the Fourth Motorized Division. Similar banks of pumps are installed at every Army motor park

Another 30,000 Wells Needed

Affirmation that the petroleum industry will be compelled to drill at least another 30,000 wells durduring 1942 was given recently at the Interstate Oil Compact Commission meeting in Fort Worth, Tex., by A. G. White, chief of the Petroleum Economics Division, Bureau of Mines. During the few months that the Office of Petroleum Coordinator for National Defense has functioned, emphasis has been made repeatedly on the necessity for not only continuing but expanding exploratory-drilling operations. Nearly equal emphasis has been placed on the desirability of eliminating unnecessary drilling for the sake of conserving steel. There has been no agreement on distinction between unnecessary and necessary drilling and prospects are remote for consolidating opinion on this controversial subject. It is admitted that the degree of necessity surrounding any development program is contingent on the price of oil, the marketable production, drilling costs, location of the property, nature of the reservoir and producing formations, lifting costs and several dozen additional variables.

The price of crude, which determines the attractiveness of risks involved in exploratory work, is likely to be the deciding factor in dividing future drilling between proven and exploratory locations. Expressions from the OPC have indicated that exploratory-drilling operations will receive more favorable consideration in allocation of available steel than inside exploitation of proven fields, particularly if the spacing program in the latter involves "unnecessary" locations. The completion chart shows a relatively close relationship between dry holes, oil wells, gas wells and total completions, indicating that the distribution of wildcat operations bears a constant ratio to proven locations this year. In the previous 6 years, dry holes followed a compara-

tively flat curve, accounted for by concentration of drilling work in less hazardous localities as petroleum demand increased. Crude prices during the 6 years were not inducive to broad-scale wildcat exploration and this condition is reflected in failure of the dry-hole curve to correlate more closely with the total completions.

It is obvious from current demand and forecasts for next year that the industry cannot concentrate a materially higher proportion of its drilling activities in exploration to the exclusion of exploitation. There must be a relatively constant balance between total completions and oil wells if the industry maintains the flexibility required by current conditions in crude production. Only through maintenance of high reserves, producible on relatively short notice, can the industry retain the flexibility in crude-oil supplies that emergency conditions require.

This is virtually certain to be the third year in the history of the oil industry that total well completions exceed 30,000 which indicates the scope of requirements faced by exploration departments of companies and independent producers.

Old Equipment Rehabilitated

In establishing a new peak in the rate of drilling operations for the past 4 months, the petroleum industry has rehabilitated equipment in some parts of the country that had been retired from service for various reasons. Rigs are now in operation, according to field surveys, which had not been economic to operate under previous conditions and probably would not be in service now except for the exigencies of requirements and the delays and difficulties in obtaining equipment.

The need for sufficient equipment to meet contingencies is even more apparent in the refining end of the industry which also is operating under an unprecedented set of conditions. The two accompanying charts showing the relationship of crude runs to operating capacity of domestic refineries and of refinery throughput to domestic crude production reflect the changes that have developed this year.

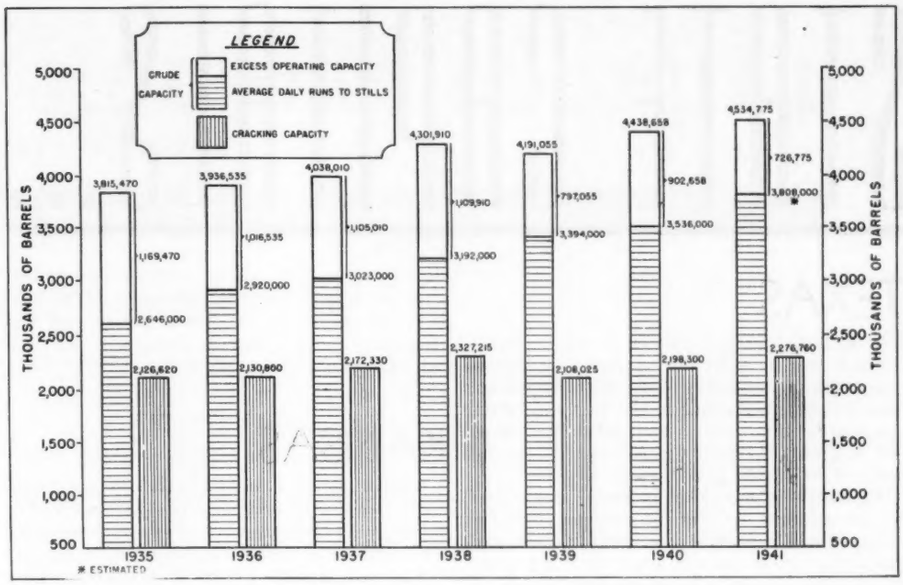
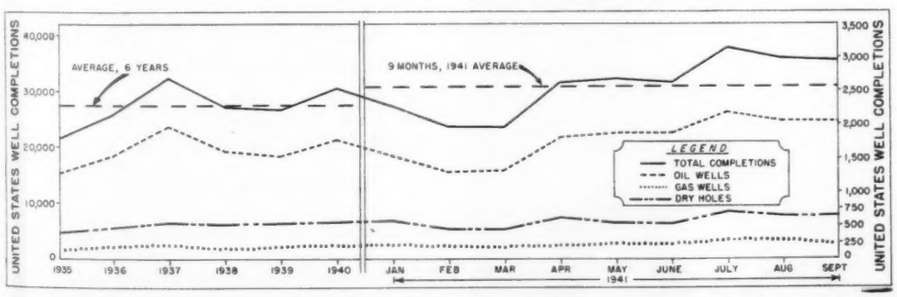


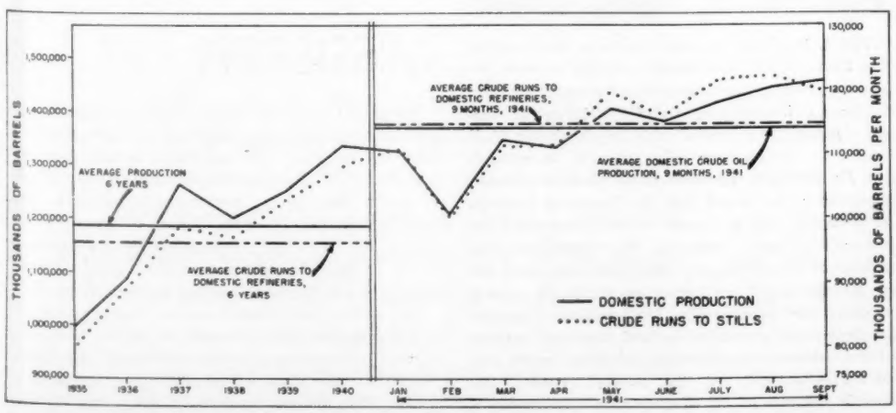
Chart showing the rise of crude runs through domestic refineries and the reduction in excess capacity

Since the end of August, crude runs to domestic refineries have been above 4,000,000 bbl. daily in 4 out of the 6 weeks for which statistics are available. Estimates are that refinery crude runs for the year will average approximately 3,808,000 bbl. The operating capacity of active refineries is calculated at 4,534,775 bbl. daily, which leaves a surplus of 726,775 bbl. of excess over the average but only a little more than 500,000 bbl. over the current rate of throughput. Runs to stills averaging 4,120,000 bbl. daily during the week ended October 18 have never been exceeded in the history of the industry. For the week ended July 12 the A.P.I. estimated throughput at 4,090,000 bbl. per day.

The accompanying chart shows the trend to greater use of refining capacity. Significance of the refinery chart is the narrow margin of total operating capacity compared to actual runs to stills. This evidence alone is held by economists as more than sufficient reason why priorities officials should consider all applications for refinery-expansion equipment from a liberal viewpoint. Most refinery officials are in agreement that 100-octane-gasoline facilities should be expanded but there is equal need, they say, for consideration of the over-all capacity picture.



This chart shows the rate of well completions with the first 9 months of this year projected to the right on a scale comparable with the averages for the past 6 years



Showing how the average crude runs to domestic refineries have exceeded domestic production during the first 9 months, the first time this condition has prevailed in recent years

Refinery Runs Exceed Production

The changed relationship of refinery operations to domestic crude-oil production is reflected in the third chart. For the first time average crude runs to stills for 9 months of 1941 have exceeded domestic crude production. From April through August, crude runs to stills were consistently higher than production and during remainder of the 9 months the relationship has been closer than normal.

Time required to expand refining capacity is one of the main factors in dictating long-range appraisal of conditions in this branch of the industry. Well-completion curves respond to mitigating influences with a normal lag of about 30 days. In contrast, from 6 to 12 months are required to adjust refining capacities upward to meet any substantial increase in demand.

The normal excess of 1,000,000 bbl. of daily refining capacity over crude runs has been reasonably constant until this year. The anomaly in 1939 was caused by permanent retirement of considerable equipment in operating refineries that had been maintained for standby service.

Records of refinery construction this year are abundantly studded with expensive specialty plants for the manufacture of aviation gasoline, synthetic rubber and explosives but additions to capacity for primary distillation have been out of balance with the increase in demand for products and in runs to stills. Refiners have projected sufficient construction work to restore the normal relationship of operating capacity to crude runs. Prompt provision for metals of all types necessary to meet the indicated requirements is essential, refiners hold, not only for the industry but for the military forces and consuming public.

STATE CAPITALS...

TEXAS

NO SUBSTANTIAL CHANGE in current basic allowable was made by the Railroad Commission in its November state-wide order. Eight shutdown days, compared with nine in October, will retain provision for 22 producing days and the net allowable will be 1,533,282 bbl. for November, an increase of 39,285 bbl. over that for October.

The allowable puts Texas production above the Bureau of Mines estimate of demand by 24,918 bbl. daily and, according to Ernest O. Thompson, commission chairman, will allow the building up of stocks against spring demand which may be surprisingly high. Considering shutdowns and 3.5 per cent normal production below the allowable, the actual output was figured at 1,479,618 bbl. a day as compared to the Bureau of Mines estimate of 1,454,700 bbl. Minute increases resulting from the overall boost in output for the state were distributed among all the fields according to the established proration formula.

Comparative basic allowables by districts are as follows:

	Sept. 1	Oct. 1	Nov. 1
Southwest Texas	318,328	321,950	322,266
Gulf Coast	357,027	357,359	351,557
East Central Texas	95,003	94,757	96,518
East Texas	511,223	511,422	511,422
West Central Texas	58,545	58,964	59,528
West Texas	347,043	353,575	360,206
North Texas	150,296	154,480	157,059
Panhandle	91,606	114,060	116,244

Commissioners said the exempt fields were unchanged and only two basic allowables of fields were revised—those of Old Ocean and Conoco Driscoll. Old Ocean field was reduced from 22,741 bbl. daily to 20,286 bbl., to prevent waste of gas, and Conoco-Driscoll was cut from 3,944 bbl. to 3,461 bbl. to conform specifically to a court order growing out of litigation. Shutdown days will be November 2, 8, 9, 11, 16, 23, 27, and 30.

The Panhandle district, which in October was shut down for only 4 days, in the new order was put on the same basis as the rest of the state. However, Commissioner Olin Culberson said in a recent special order prescribing a new basis of allocation in the Panhandle that that area would have a large production under the new system in spite of the increased shutdown days.

ARKANSAS

SPECIAL HEARING on the application of G. Scott Hammonds for a permit to drill a well in SW SW NW 8-16s-22w, Lafayette County, as an exception to one of the field rules for the Buckner field, will be held at the commission's office in El Dorado, October 31.

LOUISIANA

DAILY ALLOWABLES for November were set at 347,058 bbl. in an order handed down by the Minerals Division of the Department of Conservation last week. The total was an increase of 7,825 bbl. over the 339,233 bbl. set for October, and was entirely in the fields of the southern part of the state which were given an increase of 8,211 bbl. from 268,169 bbl. for October to 276,380 bbl. for November. North Louisiana fields were cut 386 bbl. from 71,064 bbl. to 70,678 bbl.

KANSAS

NOVEMBER ALLOWABLE for Kansas fields was set by the Corporation Commission at 257,000 bbl. a day as recommended by Theo A. Morgan, conservation director. While the figure represents a new peak allowable for the state, it is less than the increase granted each month since early last spring.

Chief reason for the slight increase was the state's pipe-line capacity which commission officials said, at the market-demand hearing, was estimated at around 260,000 bbl. a day. Testimony at the hearing indicated pipe-line capacity was the sole factor now keeping the state's production down since market demand, as calculated on the basis of purchasers' nominations, could be expected to reach close to 275,000 bbl. a day. Capacity of the state's oil wells to meet this demand seemed more than adequate since the commission's estimates of capacity, based on figures arrived at through extensive studies of actual physical production, were placed at well above 400,000 bbl. a day.

In explaining how the commission arrived at this figure of state-wide potential, Mr. Morgan said that the state potentials, as determined for allocation of allowables, are merely a yardstick and are not considered in making estimates of actual potential. He pointed out that state potentials would give the state a producing capacity of more than 8,000,000 bbl. a day and are obviously misleading.

The commission also followed Mr. Morgan's recommendations in the breakdown of allowable for currently producing wells and those expected to be completed during the month. Total allowable of 253,500 bbl. will be allocated among current wells, and 3,500 will be reserved for new wells.

AMENDED RULES and regulations under which officials of the Corporation Commission will administer the establishing of basic potentials for prorating allowables were published last week by the commission and will be effective beginning November 1. It is the first major revision of the rules in nearly 2 years, the last having been as of December 1, 1939.

Under the new regulations, potentials are to be taken once a year with essentially the same procedure as has been used in the past for determining draw-down potentials on new wells. Many Kansas wells are being prorated on the basis of potentials as much as 2 years old and corrected according to a decline curve established by mutual consent for the field in question. Officials of the commission, however, said they felt it would be advisable to establish new actual potentials throughout the state at this time.

CONSERVATION HEAD . . .

JOSEPH L. McHUGH, formerly director of the Louisiana State Conservation Department's minerals division, has been appointed acting conservation commissioner. Gov. Sam Jones of Louisiana appointed Mr. McHugh to serve until a permanent successor could be chosen for W. H. Hodges, Jr., commissioner who resigned. Immediately upon Mr. McHugh's appointment as state conservation commissioner, he named John L. Connor of Jennings, La., to succeed him as director of the Conservation Department's division of minerals. Mr. Conner has been Mr. McHugh's assistant. Gov. Sam Jones announced that Mr. McHugh might not choose to retain his present temporary post permanently. The Louisiana Conservation Department covers all natural resources such as wildlife, fisheries, coastal marine industries, forests, etc., and oil, sulfur, salt and other mineral deposits. The minerals division of the Conservation Department is the regulatory body for the oil conservation branch of the commission

OKLAHOMA

SPACING PATTERN of 20 acres to the well in the Hotulke pool extension area in Pottawatomie County has been requested by the Sun Oil Co. and hearing on the matter was set by the Corporation Commission for November 5. The application asks that the present spacing order be extended to cover new development in Sections 25-9-4 and 26-9-4.

MISSISSIPPI

MINERAL LEASES containing provision for indefinite renewal by payment of rent were declared legal by the state Supreme Court which, in so doing, declared its intention of establishing a rule to guide the state's growing oil industry. The court reversed the Amite County Chancery Court which had canceled a lease held by the estate of D. C. Lloyd and others on 2,000 acres of land owned by the Mullen Tractor & Equipment Co.

The court also handed down a ruling that all of the mineral interest under all of the leases on the sixteenth section, unless specifically set forth, accrues to the state and not to the agricultural lessee. This decision covers 704,000 acres of land, much of it leased for future oil and gas development.

The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

Published weekly by The Petroleum Publishing Company at Tulsa, Oklahoma

Atmosphere Clearing

Every day or two adds to the developments which are serving to bring an end to the confusion of the past summer within the petroleum industry. Operators can again look ahead with confidence and plan their activities accordingly.

Changes in attitude at Washington have been encouraging. There is reason to believe that leadership there is coming to realize more and more that petroleum as one of the most essential cogs in this country's emergency machine must have special consideration.

The early defense theory of petroleum rationing for civilians ended last week with the announcement that restrictions on consumption in eastern seaboard states had been lifted. The most charitable position that can be taken of the rationing fiasco is that it came in the early stages of a government program of many ramifications directed by an administration which, from its beginnings, has been prone to do something and find out later whether it was right.

In this instance many millions of consumers, in ways that could not be misunderstood, let it be known that they would not tolerate any unwarranted tampering with their petroleum supplies.

Along with the recognition of the part that petroleum is to play in the difficult days that are ahead, has come the realization that the petroleum operators must have the tools and supplies to do an ever-expanding job. A year in which a billion and a half barrels of crude oil will have to be found, produced, transported, refined and marketed will start in another 60 days. A top priority rating for the exploratory operations necessary to find this oil has been promised.

In this connection, one of the most encouraging signs is the manner in which the industry's production committees, on their own initiative, are taking hold of the complicated problem of conservation in relation to proration and other practices which have a bearing on this country's present and future oil. Exhaustive studies have been needed in these matters and the cooperative approach now under way will bring results. Important investigations by other operating divisions are being made.

Then there is the matter of price—an adequate return for all that the petroleum industry must do over the next few years. Deputy Coordinator Davies met that issue squarely at I.P.A.A.'s Tulsa meeting when he said: "Armed with the facts, the coordinator is not averse to making recommendations as to price—even increases in price—in fact, regards this as a duty of his office."

The industry clearly needs upward adjustments in many of its crude-oil and product markets. Widespread exploratory and recovery operations which will assure that this nation will have the needed petroleum 3 to 10 years from now will not materialize without them. Resolutions won't take care of the price situation. OPC wants the facts at Washington.

Finally, there is the old bugaboo of federal control. Many operators and the oil states have feared that at the end of the road of coordination they have been asked to travel, they would find control of their operations permanently located at Washington. Here again responsible officials have gone on record recently that this fear is a delusion, with assurance that they will have no part in such a plan, if it exists.

The millennium has not arrived for oil. In times like these current conditions and outlooks are certain to change and it will be necessary for operators to be on guard at all times. But October has cleared many of the clouds and has brought assurance that the industry has its operations under its own control and is headed in the right direction.

Watching WASHINGTON

By HENRY D. RALPH

OPC Studies Allocation Plan

WASHINGTON, D. C., Oct. 27.—Plans for an industry-wide allocation program to supply materials needed for exploration, production, and refining of petroleum are now being studied by the Office of the Petroleum Coordinator in conjunction with the Office of Production Management.

The move is part of the general plan instituted by Donald M. Nelson, executive director of the Supply Priorities and Allocations Board, to substitute industry allocations for the present system of individual priorities and preference ratings. However, the specific need of the petroleum industry to be accorded its proper position in the priorities picture was outlined to Mr. Nelson early this month by a committee of supply and equipment dealers, and this was followed by a letter to Mr. Nelson signed by the general chairmen of the five regional industry committees urging speedy action in order that the various branches of the industry may obtain essential supplies to meet the enormously increased demands resulting from the war.

A general survey is now being made by SPAB in order to ascertain the needs of each industry for materials and supplies, and it will be on the basis of this study that allocations for the petroleum industry will be made.

Tanker Return Results in the Lifting of Gasoline Restrictions

ANNOUNCEMENT last week of the return of an additional 25 American tankers from the British service by November 30 was followed immediately by removal of gasoline restrictions on the East Coast which had been applied in one form or another throughout the summer.

The tankers to be restored to normal service will be assigned to the East Coast. They will be released from the "shuttle service." They will be in addition to the 15 tankers which the British Government is now in the process of releasing from the shuttle service. The total number of ships to be released from this service and restored to normal operations, therefore, will add up to 40.

The Office of Production Management, acting on recommendation from the Office of Petroleum Coordinator, terminated Limitation Order L-8, effective October 24. The order, issued by the director of priorities September 30, prevented removal of gasoline from District 1. Later, the order was modified with respect to certain refineries in the western part of District 1.

Coordinator Ickes said that the return of tankers was made possible because of major improvement in the general British oil situation which was brought about by the rapid application of the American tanker and petroleum program. Negotiations concerning the return of the tankers were conducted by Coordinator Ickes with R. I. Metcalfe, chairman of the Tanker Advisory Committee of the British Ministry of War Transport, and Sir Arthur Salter, British Merchant Shipping Mission.

While the return of the 25 tankers from the British was attributed to the "speed and effectiveness with which the American petroleum and tanker program made it possible materially to better the British petroleum situation," there is considerable speculation in Washington as to other possible reasons back of the transfer.

It is recalled that Edward W. Pauley, special representative of Coordinator Ickes, only recently returned from making an intensive study of the British petroleum situation. Upon his return, Mr. Pauley was called to the White House for a lengthy conference with President Roosevelt. Although making the study at the specific request of Mr. Ickes, the latter denied all knowledge of its results.

Shortly after Mr. Pauley made his report Mr. Metcalfe flew to Washington from London and made the offer to return the 25 tankers.

The theory receiving the widest credence is that Mr. Pauley discovered that there was at least some truth to the rumors which have reoccurred periodically since the first American tankers were transferred to the British service, to the effect that tankers controlled by the British Government were being used for other than essential military purposes.

In a statement made public September 30, James A. Moffett, chairman of the California-Texas Oil Co., charged that elimination of inefficiencies in British operation of their own tankers and their exclusive use for petroleum products rather than for grain and other products would permit the immediate retransfers of American tankers to American service.

The British explanation that they were compelled to load these ships at their own producing points owing to a lack of dollar exchange, he pointed out, was obviated by the passage of the Lend-Lease Act in April.

Requested Price Increase Still Under Consideration

THE Office of Petroleum Coordinator is still studying the figures submitted by Frank Phillips, chairman of the Phillips Petroleum Co., of Bartlesville, Okla., in justification of an increase in the price of Mid-Continent crude amounting to 25 cents per barrel. There are indications that at least a part of the requested increase will be recommended to the price administrator.

With the clearing up of the East Coast shortage situation the coordinator's office is turning its attention to the problem of increasing petroleum reserves. Mr. Phillips pointed out that the demand for crude oil is now 20 per cent higher than in 1937 and is steadily rising, while during the same period the annual rate of discovery has fallen 60 per cent.

Because of the effect of price upon the exploratory effort and because of the increased relative importance of an adequate and assured reserve supply of petroleum during the present national emergency, it is felt that at least some increase in price of crude petroleum is justified.

Mr. Phillips pointed out in his request for Mr. Ickes' support for an increase in prices that the cost of finding new reserves has trebled since 1937, that the cost of finding, acquiring and producing crude oil has increased 42 cents per barrel during the same period, and that rising costs of labor, material and taxes are affecting the entire production situation and are threatening the small wells with premature abandonment.

C.I.O. Launches Campaign to Unionize Oil Workers

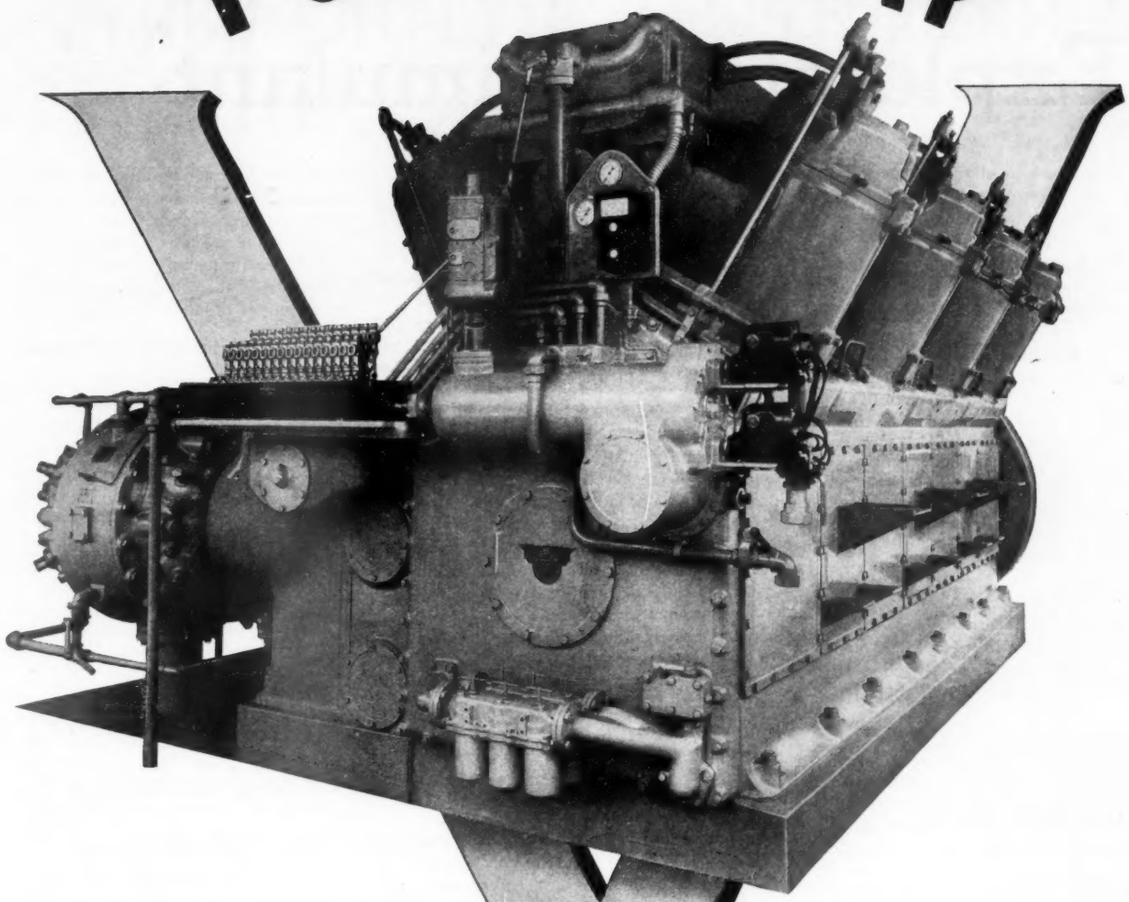
THE launching of a major C.I.O. organization campaign to unionize some 500,000 oil workers was announced Monday in a joint statement by Pres. Philip Murray, of the Congress of Industrial Organizations, and Pres. O. A. Knight, of the Oil Workers International Union, C.I.O. affiliate.

The appointment of Edwin S. Smith, former member of the National Labor Relations Board, to direct the drive, was announced at the same time. Mr. Smith will establish headquarters in Washington, and will be assisted by a staff of organizers in all major centers of the oil industry.

The Standard companies, largest remaining non-union industrial corporation, employing some 65,000 workers, will be a major concentration point in the campaign. Authorization for the launching of a $200,000 organizing drive, jointly with the C.I.O., was voted at the convention of the Oil Workers International Union in Baton Rouge, La., last September. An assessment to finance the campaign has since been ratified by the union's locals. The campaign will be jointly financed by the O.W.I.U. and the C.I.O.

The announcement of the formal launching of the drive, followed on the signing today in Pittsburgh, Pa., of an agreement between the national C.I.O. and O.W.I.U., for conduct of the campaign.

FOR VICTORY



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OPC Recognizes Price Factor As Exploration Stimulant

By ROBERT INGRAM

IN 3 days of conferences, committee meetings, speeches and some entertainment at Tulsa last week, members of the Independent Petroleum Association of America thrashed over some of the toughest problems the petroleum industry has faced and plotted a course of action. As in every other year, the question of crude prices dominated deliberations.

The association adopted a resolution declaring that the present price of crude is insufficient to assure the nation of what it expects in the way of crude oil. It twice refused, on the grounds that no limit should be placed on amount, amendments sponsored by Ralph T. Zook of Bradford, Pa., Charles F. Roeser of Fort Worth, Tex., and J. F. O'Donohoe of Wichita Falls, Tex., to ask for at least a 25-cent increase. It did, however, say 5 or 10 cents a barrel would be "grossly inadequate."

The influence of crude prices as the most influential factor in stimulating exploratory drilling, a program vigorously advocated by the Office of Petroleum Coordinator, was recognized by Ralph K. Davies, deputy coordinator, who was the featured speaker at the association's annual banquet.

"For the additional drilling which must be done," Mr. Davies declared, "and particularly for the hazardous wildcatting that must be continued and increased, you will need not only critical materials but also crude-price levels which warrant expensive exploratory search and deep development—this at a time when the national economy would be strained by merely inflationary-price movements. To prevent inflation, and at the same time to have a price sufficient to find the oil we need, calls for your presenting an adequate showing with respect to the need for finding additional reserves and the costs of discovery and development. Prices fall within the jurisdiction of the Office of Price Administration, but the petroleum coordinator is charged with the duty of making such recommendations to that office as he deems necessary, in order to assure an adequate supply of oil. Such recommendations must of course be based upon facts, and armed with the facts the coordinator is not averse to making recommendations as to price—even increases in price—in fact, regards this as a duty of his office."

Press-Relation Critics Placated

Critics of the press-relations policies of the petroleum coordinator were told by Mr. Davies that there is no objection to the district advisory committees giving interviews or disseminating in any way they see fit throughout the oil industry information on any actions taken or plans contemplated.

"Any matters deemed by the district committees to be matters of current interest, including even proposals not yet studied," said the deputy coordinator, "may be discussed as they wish, with whom they wish, at their discretion."

Some of the criticism which Mr. Davies attempted to answer developed from one of the clauses in Recommendation 7 which said: "No good could be served the public, and confusion would be bred, if committees were to undertake publicly to advocate or discuss yet unadopted policies or actions."

Earlier, Mr. Davies pounded away at fears which he said had arisen in the minds of some oil men because of a misunderstanding of the Office of Petroleum Coordinator, its purposes and functions.

"I have said before," Mr. Davies pointed out, "and I repeat here for emphasis, this task of coordinating the oil industry for national defense is a dual undertaking—a joint responsibility of government and industry. We have a single aim —to mobilize the resources of the oil industry for national defense. It is you who must produce, transport, refine and distribute the oil needed for defense and essential civilian uses; ours is the task of advising, recommending and coordinating this effort to the end that it may best serve the national emergency objective."

Continuing his explanation of the coordinator's functions, Mr. Davies warned that the oil industry must realize that it is no longer able to work normally.

Mr. Davies denied that the coordinator is building a large organization. He ridiculed published reports that the coordinating staff now totals 1,250 employes and said that the total present personnel was 171 persons.

The deputy coordinator entered categorical denial to the impression that the oil industry is now under control of Secretary Ickes' office. He said that what federal control exists is in the hands of the Maritime Commission, OPM and OPA. The coordinator's office, Mr. Davies said, is purely advisory to the bureaus where the actual-control power rests. He added that it was the coordinator's duty to present all the facts on the petroleum industry to the agencies that have control power and in this way protect the best interests of oil operators.

Equipment Needs Recognized

"The search for and the development of oil reserves requires a large quantity of critical materials which we must try to secure for you in competition with other vital industries," Mr. Davies declared in explaining further the functions of OPC. "You and I know," he went on, "that the discovery of a new and important oil field has become a costly and difficult task. I do not refer to the substantial successes of 1,000,000-bbl. pools, or even 10,000,000-bbl. pools. With our present consumption, at the rate of 1,500,000,000 bbl. annually, we must find numerous fields of 100,000,000 bbl. or more, merely to retain our present reserve position, without regard to the desirability of increasing our known reserves in proportion to the annual increase in consumption.

"Here our efforts in your behalf are complicated by the prevalence of a belief which we in the oil industry have thoughtlessly fostered, that we had a virtually unlimited supply of oil producible for an indefinite period in whatever amount the emergency might call for, merely by opening valves on wells already drilled. Most of you will agree with me, I think, that a rate of production much in excess of our present output could not be long maintained without additional drilling, and we are experiencing today a rate of consumption not even imagined a year ago. The Office of Petroleum Coordinator, with your help, will do its utmost to obtain for the industry its full share of the materials available for this vital development of additional reserves."

Major Points in Program

Resolutions enacted by the association and expressions from leaders of the group were in substantial agreement with the following points:

1. With Frank Buttram, reelected president of the I.P.A.A. for a third term, that the oil industry had been "oversold" in Washington and to the United States public; that popular belief in the industry's ability to produce fantastic quantities of crude by a "quarter-turn of a valve" was doing more harm than good.

2. With H. B. Fell, executive vice president, that the industry didn't know "what sustained rate of production could be maintained for 1 year without waste of reservoir energy."

3. With Minor S. Jameson, Jr., the I.P.A.A. Washington statistician, that market demand for oil might by next spring jump 10 per cent to 4,400,000 bbl. a day.

4. With many published reports and statements that rate of consumption was exceeding rate of discovery of new reserves. That rate of discovery was 60 per cent below 1937.

5. With each other that the only way for the industry to produce what the Government and the public expected was to raise the price of crude oil.

Mr. Buttram, Russell Brown, general counsel, and many other association leaders who had been close to Washington in recent months advised that the Government was afraid a price increase would be merely "inflationary."

Among 24 other resolutions were those protesting federal claims to submerged lands or tidelands along the coastlines, petitioning authorities for a higher supply-priority rating; asking that steps be taken to make hoarded stocks of equipment available to others for necessary operations; urging relaxation in public-land leasing regulations to encourage exploration; urging several revisions in legislation, including continuance of efforts for legislation to permit formation of secondary-recovery units in developed pools (such as Oklahoma's recent proposed law for Oklahoma City); asking specific laws permitting industry agreements such as are now prohibited; favoring the Interstate Compact Commission as a potentially powerful industry representative, and setting up a committee to advise the OPC on recommendations made to the industry.

At the final session all officers were reelected. They were, Mr. Buttram, president; Mr. Fell, executive vice president; Mr. Brown, general counsel; T. J. Steuart, Washington, D. C., assistant to the president; N. T. Gilbert, Tulsa, treasurer, and C. E. Buchner, Tulsa, executive manager. Four vacancies on the executive committee were filled by William H. Wildes, Dallas, Tex.; J. C. Graves, Saginaw, Mich.; E. C. Moriarty, Wichita, Kans., and Mr. Zook.

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Further information furnished upon request.

PROCESSES ENGINEERING PERCO RESEARCH CONSTRUCTION

PERCO DIVISION

OF

PHILLIPS PETROLEUM COMPANY

BARTLESVILLE, OKLAHOMA

Shell Completes Ventura Line

COMPLETION of the new pipe line of Shell Oil Co., Inc., linking the Ventura and other oil fields of the California coastal area with Shell's refinery at Wilmington, was celebrated recently with appropriate ceremonies.

S. Belither, chairman of the board of directors and executive vice president of the company, welded the last link in the line which will eventually (after completion of a second pump station) deliver 40,000 bbl. of crude oil daily which formerly had to be shipped by tanker. Completion of Shell's line was the first major step in the southern California oil industry's effort to relieve shortage of petroleum products caused by the transfer of many tankers to national-defense work.

In dedicating the line, which traverses two mountain ranges in its 83-mile course, Mr. Belither declared the construction of such short pipe lines offered the most immediate relief from the current tanker-shortage problem since much time is normally consumed in getting tankers into and out of port, mooring, loading and unloading. It was estimated that the new line carries crude oil which would require the carrying capacity of two tankers plying constantly between Ventura and Wilmington.

Construction of the line called for some of the most difficult pipe-laying work encountered in any section of the country. It was finished in 52 days and the first oil reached Wilmington 10 days later.

The route of the line, which is the first oil line from the Ventura field, required purchasing rights-of-way through much privately owned property, as well as obtaining franchises or licenses for construction on public highways, roads, and streets.

The cooperation of public officials, as well as private property owners, made it possible for Shell to build the line over a fairly direct route.

Two Crests Crossed

Two crests were crossed, the first immediately adjacent to Ventura Avenue oil field, where maximum elevation reached 950 ft., and the second over the Santa Monica Mountains, north of Hollywood, where the line goes as high as 1,700 ft. above sea level.

The most difficult construction, by far, was through the Santa Monica Mountains. In a few places it was necessary to lower ditch diggers over the sides of canyons by means of block and tackle operated by tractors.

Every foot of the line was buried at least 24 in. —a specification applying even when the line crossed steep V-shaped ravines. Experts who have seen the mountainous right-of-way declare it is the most difficult terrain in the United States over which a pipe line has been constructed.

Actually, before bulldozers and tractors began clearing the right-of-way, the heavy growth of brush through the Santa Monica Mountains was considered impassable for man or horse. Few people can believe that such a jungle exists within the very city limits of Los Angeles!

Possibility of fire in this dry mountain region had to be considered at all times, especially during welding operations. The contractor maintained his own fire-fighting equipment along the line, and the mountain patrol of the Los Angeles city fire department gave valuable service in prescribing regulations as well as standing by with fire-fighting equipment and trained men ready to assist in any emergency. In addition, every man on the job carried a shovel, the most vital piece of fire-fighting equipment in mountainous regions.

Where the line passed through agricultural areas, especially the numerous bean fields in Ventura County, progress of work was timed to allow crops to be harvested ahead of the construction crews.

Shell Engineers Supervise Job

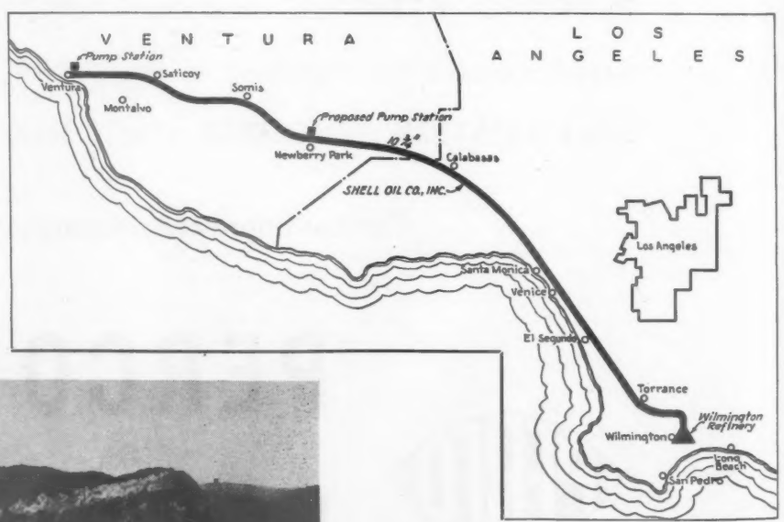
The entire job was under the supervision of the pipe-line and engineering departments of Shell in Los Angeles office. All engineering, designing, surveys, selection and purchase of materials, and inspection was done by Shell under the supervision of the pipe-line division utilizing the company's engineers. General construction of the line was contracted to Macco-Robertson Co., Los Angeles, with work under the supervision of John McLeod and Alec Robertson.

Approximately 9,000 tons of 10¾-in. seamless line pipe, weighing 40.48 lb. per foot, were used. Before delivery to the field, the pipe was covered with ½-in. mastic coating. The mastic was based on specially prepared air-blown asphalt furnished by Shell from Martinez refinery. The asphalt was developed to give the mastic coating special properties of toughness and resilience.

Since the new line handles cold oil only, the pump stations are simpler than those on most California pipe lines.

(Continued on Page 196)

Left: S. Belither, executive vice president and chairman of board, Shell Oil Co., Inc., welds final joint of pipe line, map of which appears directly below. At bottom of page the rugged nature of the terrain through which line was laid is seen



PRIORITIES.

OPC Gives Practical Review of Procedure Recommended to Get Preference Ratings

This outline of procedure is recommended by the Office of Petroleum Coordinator in making applications for preference rating for new construction projects and for use of Form P-22 in obtaining repair and maintenance materials.

Careful preparation of forms is stressed in this review which is designed to give operating companies concrete and practical suggestions on procedure that will facilitate delivery of equipment.

A major point emphasized is the desirability of itemizing all materials needed on the specified forms instead of relying on supplemental lists keyed to applications previously filed.

The amended P-22 form was published complete in the October 23 issue.

TO aid the petroleum industry in obtaining preference ratings on materials required for operation, maintenance and repair, as well as for new and additional equipment, the production division of the Office of Petroleum Coordinator has prepared an outline of instructions on the use of application forms for priorities.

Production officials emphasized the necessity of careful preparation of forms if preference ratings are to be obtained with the minimum delay. It was stated that the practice of substituting supplemental lists of needed materials instead of itemizing such materials on the forms provided usually result in lengthy delays because of the additional work involved and the heavy volume of applications which must receive attention of the petroleum coordinator's office before being presented to the Office of Production Management.

The slightly abbreviated outline of instructions follows:

The increasing demand for oil is placing an ever-growing burden on the petroleum industry. Each barrel of oil is important to national defense. There must be no letup in the search for new reserves, and every effort should be exerted to extract the known reserves with increasing efficiency.

The Office of Petroleum Coordinator has been established to be of service to the industry in every way possible to attain the objective which now is presented to it, viz., to produce more oil to meet the daily demands of defense and civilian needs. The Office of Petroleum Coordinator and the Office of Production Management are willing and anxious to help each operator and supplier obtain the materials which are necessary to assure an adequate supply of petroleum and petroleum products.

It should be added that service companies such as electrical logging, cementing, geophysical, etc., are a vital part of the petroleum industry and are regarded as operators for the purpose of securing priority assistance.

How to Obtain Preference Rating for New or Additional Equipment

A producer may need casing for a well to be drilled; he may require new tanks and separators for additional wells; he may need a pump to maintain the production on a well that has ceased to flow. A refinery may need a new compressor or a pipe line may need a new pumping unit. The supplier in turn will need these materials for distribution to the operator. In all such cases, a priority rating may be obtained by completing a PD-1 form which should be transmitted to the Office of Petroleum Coordinator.

Most current needs can be satisfied through the use of the PD-1 form, and all persons connected with the petroleum industry should become well acquainted with this form as soon as possible.

A great deal of care has been given by the Office of Production Management to the drafting of the PD-1 form. When it is properly made out it will accurately present the urgency of the applicant's needs. This will permit the Office of Petroleum Coordinator to recommend to the Office of Production Management a rating that will meet the requirements of the case as indicated. It is so important that the PD-1 form be properly completed that a number of the vital points are specifically called to the attention of the applicant:

1. A description of the material should be given similar to the description on a purchase order, i.e., the generally understood and acceptable description ordinarily used in the trade.

2. Be sure to state cost of material.

3. Delivery dates must be shown so that the needed material will be supplied when it is to be used and not before.

4. The name of only one supplier should be shown. The name of the producer or manufacturer of the material can be given as the supplier if the name of the supply house, through which the material is to be delivered, is added. The order number should be the supply house's order number and not the purchaser-user's order number.

5. State how material is to be used. If information can be shown by plat, it would be advisable to do so. When the material is to be used in a well or wells, furnish plat of location and enough of surrounding area to show spacing pattern. Plat should indicate, with appropriate symbols, all wells on the lease or leases in question, and also on the offsetting leases. The well symbols used should identify specifically (*a*) locations, (*b*) drilling wells, and (*c*) producing wells.

6. State specifically how the use of the material is essential to national defense. A general statement such as "petroleum is essential to national defense" is unsatisfactory. Show what results are actually expected from the use of the necessary scarce material.

7. The inventory of the requested material must be shown. This inventory must include all the material owned by the parent company or any of its subsidiaries, and all material on which the company has any right or option to claim ownership. Under this heading must be included all the requested material which can be regarded as being owned by the company no matter where it may be located.

8. Notarize four copies and mail them to the Office of Petroleum Coordinator. The fifth copy is to be retained for your files.

OPENS OPM OFFICE . . .

Alfred E. Ballin, an engineer, formerly head of the Oklahoma Iron Works which formed the nucleus for Bethlehem Supply Co., and at one time president of McIntosh & Seymour and vice president of the Nordberg Manufacturing Co., is director of the office which was opened this week in Tulsa by the Office of Production Management. The office is set up to aid and advise consumers in procurement of strategic materials

How to Obtain Preference Rating for Material for Repairs, Maintenance, and Operating Supplies

On October 16, 1941, the Office of Production Management issued Order P-22 which grants an A-10 rating for repairs, maintenance and operating supplies for the production, refining, transportation (excluding pipe lines), and wholesale marketing divisions. This rating is extendable from supplier to supplier and is designed to enable each operator to meet his immediate requirements for material and equipment.

"*Repairs*" means the restoration of an operator's property and equipment to a sound working condition when such property or equipment has been rendered unsafe or unfit for service by wear and tear, damage, destruction of parts, or similar causes.

"*Maintenance*" means the upkeep of an operator's property and equipment in sound working condition.

"*Operating supplies*" means any material which is essential to the operation of an operator's business and which is consumed in the course of such business, including without limitation, fuel, lubricants, catalysts, and small perishable tools; provided, it shall not include any material which is physically incorporated, in whole or in part, into any product of the operator, or into any material which the operator distributes to or stores, transports or services for another person.

The terms "repair," "maintenance," and "oper-

ating supplies" do not include material:

1. For the improvement of an operator's property or equipment through the replacement of material in the existing installation with material of a better kind, quality or design.

2. For additions to, or expansion of, such property or equipment.

3. Which is of a type not heretofore carried on the operator's books under "repair," "maintenance," "operating supplies," or the equivalent.

Order P-22 cannot be used to acquire additional equipment even though the additional equipment may be considered as maintenance.

A supplier cannot use Order P-22 to acquire material for inventory to be used by his customers in case of breakdowns. He can, however, replenish his inventory by extending the A-10 rating granted for materials sold under this order.

Application of Preference Rating Under Order P-22

An operator or supplier, in order to apply the preference rating to deliveries of material to him, must endorse the following statement on the original and all copies of the purchase order or contract for such material, manually signed by a responsible official duly designated for such purpose by such operator or supplier:

"Material for maintenance, repair, or operating supplies—Rating A-10 under Preference Rating Orders P-22, as amended, with the terms of which I am familiar."

Such endorsement shall constitute a certification to the Office of Production Management that such material is required for the purposes stated and that the application of the rating is authorized by this order. Any such purchase order or contract for such material shall be restricted to material the delivery of which is rated in accordance therewith.

The operator or supplier placing any such purchase order or contract and the supplier selling the material covered thereby must each retain endorsed copies of such purchase orders or contacts, segregated from all other purchase orders or contracts, for a period of 2 years from the dates thereof for inspection by authorized representatives of the Office of Production Management.

The authority granted by Order P-22, by the endorsement of the certification given above, is operative between supplier and purchaser, and does not require transmittal of any forms to the Office of Petroleum Coordinator or the Office of Production Management.

It would be advisable for all operators and suppliers to obtain a copy of the amended Order P-22 and study it carefully.

If the A-10 rating granted by Order P-22 is not high enough to obtain the necessary scarce materials for repairs, maintenance, and operating supplies, application for a higher rating should be made on the PD-1 form.

Application of Supplementary Order M-21-b.

Order M-21-b became effective September 2, 1941. This is a supplementary order to M-21, and is designed to give every assistance to steel warehouses in obtaining their reasonable requirements so that small industrial users will not be unduly hampered in obtaining their day-to-day requirements for defense needs.

A warehouse is considered to be any person who receives physical delivery of steel from a producer of steel for sale or resale in the form received. Steel may not be obtained under this order for use in a fabricating shop operated in connection with a warehouse.

A quarterly quota allotment of steel products in 26 classifications may be obtained. Warehouse quotas for hot-rolled concrete reinforcing bars, oil-country pipe and tubing, wire and wire products, tin and terne plate, and galvanized sheet and strip are established in a directive dated September 26, 1941, copies of which have been distributed to each warehouse by its steel producers.

This order grants an A-9 rating and may be of considerable assistance to many supply houses, both small and large. It is suggested that all those interested should study Orders M 21 and M-21-b.

Use of PD-73 form.

A completed PD-73 form is a statement by the customer to the steel producer (which would be the steel mill), classifying his purchase order or contract for steel. In other words, operators who order steel directly from the mill must complete a PD-73 form and attach it to their purchase order on that steel mill. Under the instructions issued to all producers and purchasers of steel by the Office of Production Management on September 30, suppliers need file only a single PD-73 form each month covering all orders in a single group classification placed with the producer during the month.

Operators do not need to use form PD-73 when purchasing steel from a supplier who is not a producer of steel.

Project Rating.

A priority rating may be obtained for a project such as a drilling program or the construction of a gasoline plant, cycling plant, repressuring plant, pipe line, etc. In order to obtain a project rating it will be necessary to submit, in quadruplicate, a complete prospectus. This prospectus should include detailed plans, and describe the purpose, use, materials involved, costs, and give the required delivery schedule.

How to Obtain Material in Case of Emergency

When a very definite emergency arises an operator must have immediate action. It is necessary that he obtain a preference rating that will enable him to buy, or borrow and replace, the necessary materials. This would apply to additional equipment, or to materials for repairs and emergency inventory when the A-10 rating is not high enough to get results.

When such an emergency arises, telegraphic action may be obtained. The following information must first be wired by the operator himself:

(*a*) Date emergency arose, its exact location, and cause of emergency.

(*b*) Equipment needed and its operating importance.

(*c*) Supply of requested material which applicant has on hand or has available.

(*d*) Name and address of supplier from whom the needed material can be obtained.

The Office of Petroleum Coordinator will request the Office of Production Management to dispatch a rating by wire the same day or not later than the following day.

In all cases, the applicant must complete and file with the Office of Petroleum Coordinator a PD 1 form for the material requested by wire. This action is necessary to the completion of the record.

It must be remembered that preparations should be made in advance to avoid delays in operation, and emergency relief should be sought only in those cases where a very definite emergency has arisen that could not have been foreseen.

Status of These Instructions.

The circumstances of each case must govern the completion of the forms. The instructions set forth above are designed to facilitate such completion and to indicate the minimum information necessary to an adequate analysis of an operator's application, but do not constitute a single formula into which every case may fall.

D. J. Brown Retires as "Oilwell" Vice President

Upon the completion of 54 years of continuous service with Oil Well Supply Co., D. J. Brown, vice president, has resigned at the age of 70, under the company's retirement plan.

After finishing high school, Jim Brown joined "Oilwell" as office boy August 25, 1887. He held

D. J. BROWN

successively the positions of sales manager, treasurer, general manager, and vice president.

At the Duquesne Club in Pittsburgh, Pa., on October 18, Mr. Brown was honored at a luncheon given by his long-time "Oilwell" and National Tube Co. associates. As a memento, an engraved silver tray was presented to him in token of friendship and esteem.

"D. J.," as he is popularly known, will continue his residence, and welcome his friends, at his suburban home in Allison Park, near Pittsburgh.

Lete Kolvin Verdict Against Oil Companies to Be Appealed By Sinclair and Minnehoma

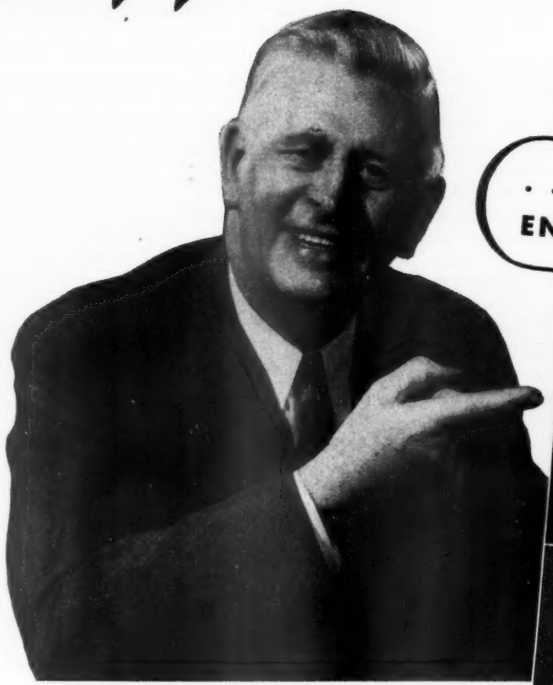
Steps to appeal were started this week by Sinclair Prairie Oil Co. and Minnehoma Oil Co., defendants in a suit attacking validity of title to 160 acres of producing oil property containing 15 producing wells and a natural-gasoline plant between Drumright and Oilton, in Creek County, Oklahoma.

Decision to appeal was announced last week at Sapulpa, Okla., where District Judge C. O. Beaver held against the two defendant companies in the title dispute that has been pending for 10 years. The court decided that $7,413,286 in cash, representing oil and gasoline produced from the land since 1915, less cost of operations, with accumulated interest, and control of the land should be turned over to heirs of Lete Kolvin and her husband, Joe Stevens.

Magnetic Storm

TUCSON, Ariz., Oct. 23.—A moderate magnetic storm began October 22 at 7 a.m., and ended October 23 at 5 a.m., central standard time.

Bring your POWER problems to us



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PETROLEUM ELECTRIC POWER ASSOCIATION

Box 1498, Oklahoma City, Oklahoma

Journal "Specials" Await the "All Aboard" Signals

IT'S a "full house" on the special trains The Oil and Gas Journal is sponsoring to San Francisco for the A.P.I. meeting. The demand for reservations on these crack trains taxed the facilities of the Santa Fe Railway to accommodate the requests. A last-minute flood of requests for reservations developed, which unfortunately couldn't be honored, and had to be diverted to regular trains of the Santa Fe and other railroads.

Nothing has been omitted that will assure the comfort and pleasure of the passengers of the specials. The finest equipment available on any railroad has been secured, and the fastest schedule consistent with safety that could be arranged has been perfected. Special services have been planned, and every thought extended to make the trip a memorable one. Good fellowship, indescribable scenery, enjoyable meals and pleasant surroundings will be the lot of oil men on these trains.

One of the trains will leave Chicago at 11:45 a.m., Friday, October 31, and the other will leave Tulsa at 4 p.m., Friday. The two trains will meet at Newton, Kans., and will proceed as separate sections to the coast. Arrival in San Francisco is scheduled for 9 a.m., Sunday, November 2.

Once arrived in San Francisco, the A.P.I. entertainment committee will get under way with its planned program of features which will be sandwiched in between business and technical sessions of the meeting. These features include sightseeing excursions, cruises, football games, luncheons, golf tournaments, etc. A complete listing of these events appeared in last week's issue.

Six speakers have been arranged to address the general sessions and as after-dinner speakers at the annual banquet. A new speaker, not previously announced, will be Brig. Gen. Walter B. Pyron, special assistant to the under secretary of war, who will speak at the general session on Thursday.

Continuing with a feature that was initiated with the meeting last year, the Petroleum-Industry Photographic Salon, sponsored jointly by the Institute and the Photographic Society of America, will be open to the public daily throughout the meeting. These photographs portray every phase of the operations of the petroleum industry, the pictures having been selected by photographers from every section of the United States.

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First Shipment of Toluene Made From Houston Plant

HOUSTON, Tex., Oct. 28.—First shipment of nitrate-grade toluene from the new Baytown Ordnance Works, owned by the U. S. Government but built and being operated for the Army by Humble Oil & Refining Co., was made Thursday, October 23, just 1 year from the day contracts for construction of the plant were signed by the Humble company and the Army Ordnance Department. The event, witnessed by officials of the Humble company, various Army and Navy officers, representatives of contractors who had a part in the construction of the plant, and a number of other invited guests, marked the official completion and starting of regular production of the plant. The plant, costing approximately $12,000,000, has been on stream for several weeks, well ahead of the scheduled date of completion.

For the occasion, the large delegation from Houston was transported to Baytown in special buses as the guests of the Humble company. Following an inspection of the plant, luncheon was served on the grounds, which was concluded with an informal but appropriate ceremony dedicating the plant to national defense. Hines H. Baker, vice president and director of the company in charge of refining, presided at the ceremony, paying tribute to the efforts and cooperation of all who had a part in the project, and introducing for short talks Harry C. Wiess, president of the company; Dr. E. Voss, chief engineer of the refining department; Col. John G. Booton, commanding officer at San Antonio of the Army Ordnance Department over the Baytown Works, and Maj. John T. Morgan, constructing quartermaster of the Army at the plant. The shipment consisted of two tank-car loads.

During the last war, small quantities of toluene were made from petroleum by extraction from some crude oils and cracked naphthas. The experts of the Ordnance Department became convinced as long as 2 years ago that the supply of toluene from these two methods would be wholly inadequate for prospective military needs, and they set forth in serious quest of a large new source of toluene to keep pace with the stupendous military operations in this age.

This quest led officers of the Ordnance Department to contact technical men in the petroleum industry, including representatives of the Standard Oil Co. of New Jersey. Fortunately, considerable research work in the field of synthetic conversion and extraction had already been done by Standard Oil Development Co. and by Humble, an affiliate. In fundamental laboratory research to broaden the use of petroleum and its products and, specifically, to improve the quality of gasoline, it had been observed that one process produced by synthesis relatively large quantities of toluene. Furthermore, earlier laboratory work in the extraction of aromatic solvents from naphthas had indicated a method of separating toluene of the necessary purity. The laboratory results indicated a method which might be used in meeting the Army's needs for large quantities of toluene for national defense. Although work along these lines has not reached the stage of pilot or plant-scale operations, the idea was of great interest to the Army. Its representatives urged that every effort be made to develop the process for practical use in quantity production. The Jersey company responded by appropriating $150,000 for experimental work on the project.

In order to avoid the delay and expense involved in the construction of a pilot plant for demonstration purposes, it was necessary to use the facilities of three different refineries in a co-operative program. A quantity of narrow cut naphtha was produced at Humble's Baytown refinery and shipped by tanker to the Bayway refinery of Standard Oil Co. of New Jersey. The facilities of an improvised hydroforming plant at the Bayway refinery were used for the conversion of certain fractions in this naphtha to toluene. A selected part of the product of the operation was returned by tank cars to Baytown where facilities were available for separating the toluene from the hydroformed naphtha. This was shipped next to the Baton Rouge refinery of the Standard Oil Co. of Louisiana for acid treating and distillation to toluene. The final product was tested and found to meet all Army specifications. Out of the naphtha originally shipped from Baytown a small quantity of finished material was made available to the Army and shipped on its order to a manufacturer of explosives for conversion into TNT.

Representatives of the Army kept constant check on the work and handled the disbursement of funds. Materials from all over the country were required, and shipments were given special consideration by the railroads. On September 6, 1941, a month and a half ahead of schedule, the unit was put "on the line." The charge stock for the toluene plant is a selected cut of naphtha obtained from the Baytown refinery. The actual manufacture of toluene involves several highly complicated operations, which differ from ordinary refinery processes. The final product toluene which is 99.7 per cent pure, is moved by tank cars to plants manufacturing high explosives.

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Eleven New Appointments Made by Oil Coordinator

Additional appointments to the Washington and field offices of the Office of Petroleum Coordinator for National Defense were announced Tuesday as follows:

Washington office:

Willis Crane, transportation analyst, formerly transportation lawyer, Department of Agriculture.

George Gibson, refining materials engineer, formerly with Hancock Oil Co., Long Beach, Calif.

James H. Hall, assistant to the director of conservation, formerly with Texas Co. of Mexico.

Herbert J. Hoffman, assistant petroleum analyst, associated formerly with Standard Oil Co. of New Jersey at Aruba, Netherlands West Indies.

Edward H. Lynch, associate director of Transportation Division, formerly assistant general manager in charge of distribution, Gulf Oil Corp., Pittsburgh, Pa.

Robert W. Olinger, economic analyst, formerly engaged in mining and oil endeavors in Mexico and Brazil.

Clyde Thomas, senior attorney, formerly assistant United States attorney for southern district of California, Los Angeles.

Joseph Winterberger, chief supply technician, formerly associated with W. M. McEldowney, Pittsburgh, Pa., as auditor-inspector.

Justin R. Wolf, senior attorney, formerly attorney, Federal Power Commission, Washington, D. C.

District 3, Houston, Tex.:

John B. Murrell, conservation engineer, formerly division production engineer, Shell Oil Co., Inc., Houston, Tex.

District 5, Los Angeles, Calif.:

Everett G. Trostel, conservation engineer, formerly petroleum engineer, Union Oil Co. of California, Los Angeles.

Refinery Expansion

Frame Six-Point Program to Overcome Deficiency in Refining Capacity for 100-Octane Gasoline

WASHINGTON, D. C., Oct. 28. — A six-point program in connection with the all-out effort to overcome an indicated serious deficiency in refining capacity for 100-octane aviation fuel was announced today by the Office of the Petroleum Coordinator.

Following up a recent meeting here at which the deficiency for the first 6 months of 1942 was estimated at 39,000 bbl. daily, Wright W. Gary, director of refining, has written subcommittee chairmen in each of the five districts requesting "immediate action" in connection with the new program. This program requests the following action on the part of the subcommittees:

1. Prepare and submit a tabulation setting forth quantity and quality of base stocks now used in the manufacture of 100-octane number and other grades of aviation gasoline.

2. Make a survey of potential production of base stocks of high-octane number which are not now used in aviation gasoline but for which facilities exist to manufacture these base stocks to specifications. Mr. Gary informed the subcommittees the survey should include a statement of future commitments which have been made for these stocks, and requested them further to advise companies that are using low-octane base stocks where high-octane-number base stocks can be obtained.

3. Present to the director of refining a tabulation of the outside isobutane requirement for all proposed plants set forth in recent committee reports, and then contact with individual companies for information with regard to commitments for this isobutane so as to eliminate duplication of raw-materials source.

4. Survey and file a tabulation showing present isopentane segregation, where this material is now used, and the present and future commitments for and availability of this material.

5. Investigate all existing hydrogenation capacity available and report on present use of this codimer hydrogenation, and the actual availability of hydrogenation capacity not now in use. Mr. Gary said particular attention should be given to the defense importance of present hydrogenation operations.

6. Investigate and report on a suggestion that high-octane base stocks can be obtained for District 2 (Mid-Continent) by barge shipments out of District 3 (Gulf Coast), and that excess high-octane base stocks available in District 1 (Atlantic seaboard) can be utilized by shipment of blending agent from the Gulf Coast.

Natural Gasoline

Natural-Gasoline Output Raised To 182,000 Bbl. Daily

Production of natural gasoline increased in August to 5,639,000 bbl., a daily average of 182,000 bbl., the Bureau of Mines reported last week. August production compares with a total natural-gasoline yield of 5,252,000 bbl. in July, a daily average of 169,000 bbl.

Production figures for August and July and for the first 8 months of this year and 1940 (in thousands of gallons), follow:

	Production			
	Aug. 1941	July 1941	Jan.-Aug. 1941	Jan.-Aug. 1940
Appalachian	5,930	5,636	58,516	52,536
Ill., Mich., Ky.	5,760	5,544	41,093	18,751
Oklahoma	32,597	31,375	249,056	265,936
Oklahoma City	6,062	5,435	46,448	54,125
Osage County	5,059	5,005	36,851	35,022
Seminole	9,683	9,441	73,102	79,350
Rest of state	11,793	11,444	92,655	97,439
Kansas	5,330	5,248	46,803	41,901
Texas	105,255	100,749	744,668	588,745
Gulf	27,239	26,194	180,566	113,044
East Texas	16,630	15,878	116,001	112,348
Panhandle	24,240	23,508	188,315	168,011
North Texas	2,208	2,348	17,728	30,235
West Central	4,857	4,734	39,439	41,046
Rest of state	30,081	28,087	202,619	124,061
Louisiana	20,345	10,454	87,997	73,730
Arkansas	2,903	2,955	22,969	20,624
Rocky Mountains	8,921	8,897	66,177	60,710
California	49,792	49,726	384,225	389,319
Huntington Beach	2,926	2,746	20,942	21,344
Kettleman Hills	9,343	9,716	76,300	83,617
Long Beach	7,538	7,594	59,329	59,642
Santa Fe Springs	4,767	4,735	37,350	37,935
Ventura Avenue	4,881	4,700	37,890	42,736
Rest of state	20,337	20,235	152,414	144,045
Total	236,838	220,584	1,701,504	1,512,252
Daily average	7,640	7,116	7,002	6,198
Total (thousands of barrels)	5,639	5,252	40,512	36,006
Daily average	182	169	167	148

For the first 8 months this year, natural-gasoline manufacturers of this country have produced 40,512,000 bbl., compared to 36,006,000 bbl. for the same period a year ago.

The most substantial increase in the country was reported in Louisiana where August production was nearly double that reported in July. The sharp increase in Louisiana's production was caused by inclusion of the Cotton Valley plant output for the first time. Texas' production was up about 4,500,000 bbl. and the Oklahoma output advanced 1,200,000 bbl.

Shipments to jobbers and retailers increased in August and were 28,308,000 gal., compared with 22,008,000 gal. in July, while shipments to refinery-owned bulk plants decreased from 5,922,000 gal. to 4,494,000 gal. Exports increased from 4,662,000 gal. to 5,460,000 gal. The average vapor pressure decreased for all shipments except refinery-owned bulk plants.

Inventories of natural gasoline declined 210,000 bbl. during August and, at the end of the month, totaled 6,107,000 bbl.

Natural Gas

Natural-Gas and Natural-Gasoline Industries to Cooperate With OPC

NEW YORK, Oct. 23.—A program of cooperation between the natural-gas and natural-gasoline industries and the Office of Petroleum Coordinator was adopted today at a meeting held at the Waldorf-Astoria. Present were Robert E. Allen, director of production, Office of Petroleum Coordinator; Justin R. Wolf, counsel, and Paul Raigorodsky, associates of Mr. Allen, and 90 representatives of natural-gas companies, including T. J. Strickler, president of the American Gas Association, and J. French Robinson, of Cleveland, Ohio, chairman of the association's Natural Gas Section.

Mr. Allen announced that the Office of Petroleum Coordinator is organizing a Natural Gas Section to coordinate defense activities of the industry with respect to production and transportation of natural gas, and to the processing and manufacture of derivatives of natural gas, including natural-gasoline, liquefied-petroleum-gas, carbon-black and recycling operations, and the transportation thereof. He said the country had been divided into five regions or districts, similar to the setup of the oil industry, and the following had accepted appointment as regional chiefs of the districts:

Frank Brewster, president, Belmont Quadrangle Drilling Co., Bradford, Pa., District 1; W. K. Warren, president, Warren Petroleum Corp., Tulsa, District 2; D. E. Buchanan, president, Hanlon-Buchanan, Inc., Tulsa, District 3; Robert Hendee, general manager, Colorado Interstate Gas Co., Colorado Springs, Colo., District 4; William Moeller, Jr., vice president, Southern California Gas Co., Los Angeles, Calif., District 5.

FRANK M. BREWSTER
President, Belmont Quadrangle Drilling Co., Bradford, Pa.

W. K. WARREN
President, Warren Petroleum Co., Tulsa

D. E. BUCHANAN
President, Hanlon-Buchanan Inc., Tulsa

R. W. HENDEE
General mgr., Colorado Interstate Gas Co., Colorado Springs, Colo.

WILLIAM MOELLER, JR.
Vice pres., Southern California Gas Co., Los Angeles, Calif.

R. A. Broomfield, Sr., Retires As Barnsdall Vice President

R. A. Broomfield, Sr., executive vice president of Barnsdall Oil Co., will retire from active service on October 31. Mr. Broomfield first entered the oil business as treasurer of Guffey Petroleum & Refining Co., in 1901, at Port Arthur, Tex. He became associated with T. N. Barnsdall, founder of Barnsdall Oil Co., in 1903 and served in Pennsylvania and Mid-Continent fields until 1909. During the latter year he was appointed resident manager of Barnsdall's California properties and has been actively identified with the development of the petroleum industry in California since that time. He will continue as a director of the company.

W. C. Whaley, Los Angeles, Calif., a vice president and director of the Barnsdall company, will succeed Mr. Broomfield as chief executive of the Pacific Coast operations.

E. M. Skeehan, Tulsa, treasurer, has been made a member of the board.

Since 1924, Mr. Broomfield has been a director of the California Oil and Gas Association, serving as president during 1929. He was elected to the directorate of the American Petroleum Institute in 1930, and is a director of the Independent Petroleum Association of America.

Mr. Broomfield was one of the organizers of the Oil Producers Agency of California, and has been a director of this association since its inception. He served as its president during the eventful N.R.A. days, from November 1935 to April 1937.

Mr. Broomfield's retirement from the oil business will afford time to pursue his hobbies—fishing, hunting, and ranching.

Louisiana-Arkansas Association Unanimously Reelects All Officers

SHREVEPORT, La., Oct. 27.—The regular annual meeting of the Louisiana-Arkansas Division of the Mid-Continent Oil and Gas Association was held in the association's offices in Shreveport on October 24. There were no technical papers presented nor any other business transacted except the election of officers for the coming year. Clarel Mapes, general secretary of the association with offices in Tulsa, attended the meeting.

The officers of 1941 who were unanimously reelected to serve in 1942 include the following: President, Charlton H. Lyons, Lyons & Prentiss; vice presidents, John J. Frommer, Ohio Oil Co.; J. T. Goodman, Gulf Refining Co.; D. W. Harris, Arkansas Natural Gas Corp.; L. M. Moffitt, Triangle Drilling Co., and R. J. O'Brien, O'Brien Brothers Drilling Co.; secretary-treasurer, A. R. Campbell, all of Shreveport.

Other officers elected were those members chosen from the Louisiana-Arkansas division to the general board of directors of the association. These include the following: B. A. Hardey, independent operator, Shreveport; Tinsley Gilmer, Humble Oil & Refining Co., New Orleans; George A. Willson, Standard Oil Co. of Louisiana, Shreveport, and Ralph T. Zook, Sloan & Zook Co., Bradford, Pa.

DEATHS

DALE F. CROASMUN, 54, Pennsylvania gas producer, died last week in a Kane, Pa., hospital, death resulting from a stroke suffered a week before he died. His widow, two sons and two daughters survive.

DAN McLEOD, JR., 49, employe for 23 years in the Sun Oil Co., Dallas, Tex., office, died October 20. At the time of his death he was assistant chief clerk of Sun's accounting staff. His widow, a daughter and two sons survive.

WALTER T. BOVELL, 52, Dallas, Tex., construction engineer in the sales department of Magnolia Petroleum Co., was killed at Beaumont, Tex., October 23.

L. B. HANCOCK, 64, one of Texas' early oil-drilling contractors, died October 19 at Bowie, Tex. Mr. Hancock brought in the first well for the late Neils Esperson, and also drilled many of the successful wells in Humble.

A. E. BLOHM, independent oil man of Temple, Tex., died there October 21. He was identified with the milling business prior to entering the oil business. His widow survives.

BENJAMIN EUGENE PARRISH, 52, of Mission Manufacturing Co., Houston, Tex., died October 14, at a Dallas, Tex., hospital. He spent his entire life in the oil business, as drilling contractor, independent operator, engineer and with supply companies. He is survived by his widow and a son.

JOHN F. HAIRSTON, 55, for 20 years an accountant for the Texas Co. at Houston, Tex., died October 23 in a Houston hospital. His widow and two sons survive.

ISAAC GREENIZEN, 75, died October 13 at Grosse Point, Mich. Mr. Greenizen was for 23 years manager of the Ontario Lands & Oil Co., and for some years was president of the Canadian Crude Petroleum Producers Association.

FRANK EDWARD BAKER, 85, a pioneer in the oil industry, died October 25 at a Tulsa hospital. As a 7-year-old boy he dipped oil at Oil Creek, Pa., and for 78 years was identified with the oil business, as drilling contractor and producer. A daughter and three sons survive.

MAURICE W. O'BRIEN, president of Seaside Oil Co., Santa Barbara, Calif., died in Santa Barbara, October 24, following an operation.

E. D. HOLCOMB, 62, drilling contractor and oil man, died at a Shreveport, La., hospital after an illness of 10 days. Mr. Holcomb was a partner with his brother-in-law, D. Thomason, in the Holcomb & Thomason Drilling Co., with offices in Shreveport. They discovered the Jefferson field in Marion County, Texas, and have holdings there and in the Rodessa field. His widow and a son survive.

CALENDAR

October

SOCIETY OF AUTOMOTIVE ENGINEERS, national aircraft production meeting, Biltmore Hotel, Los Angeles, Calif., October 30-November 1.

CALIFORNIA NATURAL GASOLINE ASSOCIATION, Los Angeles, Calif., October 31.

November

AMERICAN PETROLEUM INSTITUTE, twenty-second annual meeting, St. Francis and Palace Hotels, San Francisco, Calif., November 3-7.

SOCIETY OF AUTOMOTIVE ENGINEERS, West Coast transportation and maintenance meeting, San Francisco, Calif., November 5-6.

AMERICAN ASSOCIATION OF OIL-WELL DRILLING CONTRACTORS, first annual meeting, Dallas, Tex., November 13-14.

SOCIETY OF AUTOMOTIVE ENGINEERS, national transportation and maintenance meeting, Statler Hotel, Cleveland, Ohio, November 13-14.

December

EXPOSITION OF CHEMICAL INDUSTRIES, eighth annual meeting, Grand Central Palace, New York, December 1-6.

NEW MEXICO OIL AND GAS ASSOCIATION, Artesia, N. M., December 3.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Southeastern district meeting, New Orleans, La., December 3-5.

OKLAHOMA STRIPPER WELL ASSOCIATION, Tulsa, December 5.

A. P. I. NUMBER

Next Week

This number, featuring the annual convention of the American Petroleum Institute, will afford the reader a comprehensive and interpretative coverage of the meeting. Included will be:

- **Report on the general sessions and addresses by guest speakers.**
- **Technical papers presented at the various sessions.**
- **Prize-winning photographs in the photographic salon.**
- **Committee reports.**

THE MARKETS*

CRUDE OIL: Premiums are being paid in several sections of the country but posted prices remain unchanged. The offices of price administration and petroleum coordination continue studies of cost data submitted by Mid-Continent and Pennsylvania region operators to determine the validity of claims that higher postings are justified.

REFINERY PRODUCTS: Gulf Coast suppliers are obtaining higher prices for certain grades of motor fuel than authorized by the price administrator in awards of lend-lease contracts. East Coast and interior markets are firm at unchanged prices. The California market is inactive, except for fuel oil which is moving freely.

TANK WAGON AND POSTED DEALER: Dealer and consumer tank-wagon prices were reduced 1 cent at Memphis, Tenn. Markets elsewhere in the country were steady at unchanged quotations.

FINANCIAL: Oil securities stiffened last week. Average of 30 representative stocks for week ended October 25: High, 26.75; low, 25.41; close, 26.62. Week ended October 18: High, 25.96; low, 25.06; close, 25.47.

*Detailed information in the market section.

For the project of laying over 400 miles of 26-in. pipe this year, Natural Gas Pipeline Co. of America has adopted the unusual practice of protecting the coating, where the backfill contains rock and clods, by wrapping the pipe with mats made of asphalt-impregnated veneer slats held together by wire. Construction practices used in laying the line are discussed in an article on Page 37

ENGINEERING & OPERATION

In This Section

OCTOBER 30, 1941

NEW THERMAL POLYMERIZATION UNIT INSTALLED BY PURE OIL CO.

By C. M. Ridgway and P. A. Maschwitz — Page 30

Refinery gas at Pure Oil Co.'s Smiths Bluff plant varies in both quantity and composition from day to day due to the different crudes used and the products manufactured. A thermal polymerization unit was selected as being the most attractive method of processing this gas. Its operation is described in the article.

NEW PRACTICES USED IN LAYING 400 MILES OF 26-IN. PIPE

By Paul Reed — Page 37

Outstanding pipe-line project so far this year has been the 403 miles of 26-in. line laid by Natural Gas Pipeline Co. of America. Wall thickness of the pipe was reduced, factory bends were used, and special practices developed in the laying of this line. The methods introduced here may have a large effect on future construction.

CORRECTING ENGINE-TEST DATA BY MEANS OF A NOMOGRAPH

By Robert O. Kinsey and Elmer E. Batzell — Page 42

Presentation is made by the authors of a nomograph for correcting observed data to standard when determining the brake horsepower of an internal-combustion engine. This replaces a simple but cumbersome formula used for the purpose.

OPERATING IDEAS — Page 42

REFINERY IDEAS — Page 44

QUESTIONS ON TECHNOLOGY—By W. L. Nelson, Technical Editor — Page 46

New Thermal Polymerization Unit Installed by Pure Oil

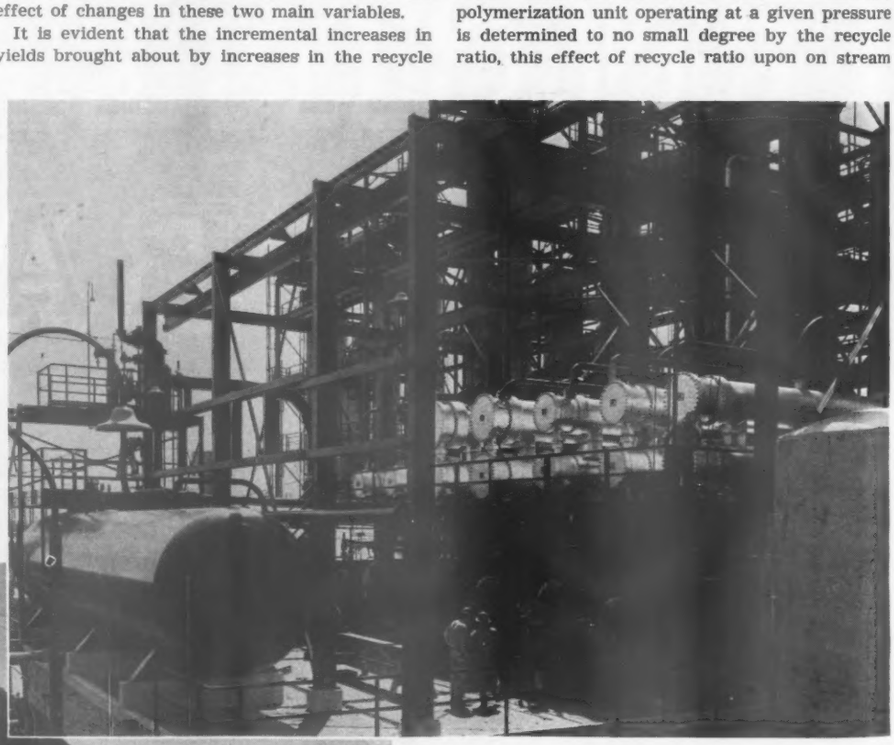
By C. M. RIDGWAY and P. A. MASCHWITZ
Pure Oil Co.

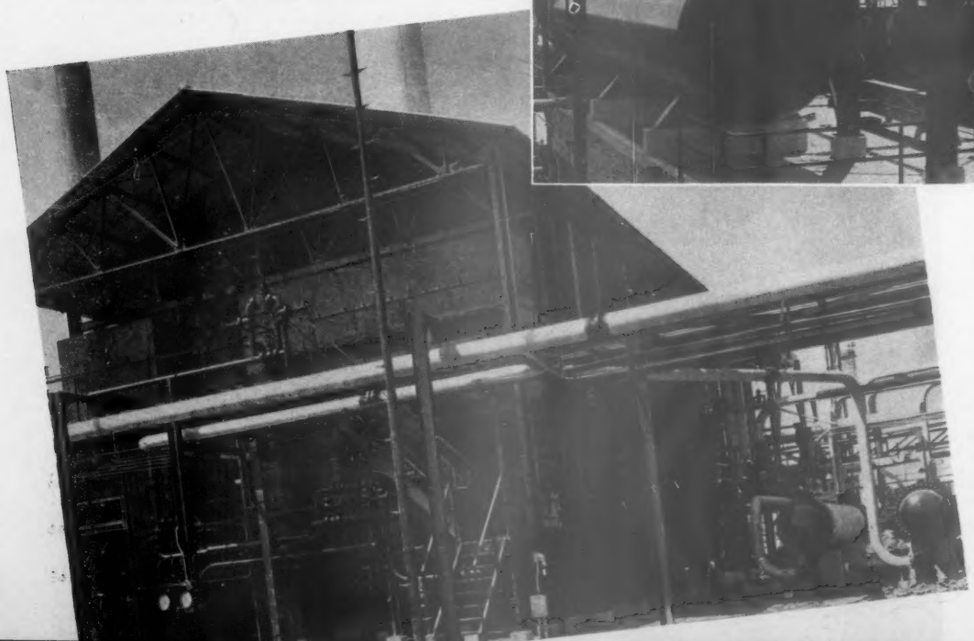
AT the Pure Oil Co.'s Smiths Bluff refinery near Nederland, Tex., a considerable proportion of the crude oil is charged to two modern combination cracking units of which one has approximately twice the capacity of the other. The remainder of the crude is processed by tube stills and single-coil cracking units which are either used to crack distillates or to reform virgin naphthas. Since the refinery is operated to produce a rather wide range of products, among them being technical naphthas, gasoline, burning oils, domestic furnace oil and Bunker C fuel oil, the crude oils charged from day to day differ considerably in character, ranging from naphthenic Gulf Coast crudes on through to paraffinic crudes similar to Rodessa. The production of refinery gas is, as would be expected, subject to wide fluctuations, the volume and composition depending upon the number of units on stream, the type of products, the crude oil processed and the vapor pressure of the gasoline.

As a part of a long-range program, a study of the problem of converting the gas into marketable products was initiated some 2 years ago. It was apparent that the process finally adopted must not only have sufficient flexibility to handle wide changes in gas load, but it also must take into account the reasonable prices for which natural gas and electrical power are available on the Gulf Coast. A preliminary investigation proved that thermal polymerization was the most attractive method of processing the gas and then studies leading to the selection of the operating conditions were undertaken.

Present refinery operations and those anticipated for the next few years were reviewed, and it was ascertained that the thermal polymerization unit should be capable of handling gas loads ranging between 3 million and 14 million cubic feet of gas per day. At the same time, a typical gas composition and a propane recovery to be used for design purposes were established for each season of the year. The effect of operating conditions, such as soaking temperature, recycle ratio and coil pressure, on yearly gasoline yields was determined for these gas compositions. The results of changes in recycle ratio and operating pressure upon the yearly gasoline yields for one refinery operating procedure and a particular feed recovery plant are shown in Fig. 1. It is believed that while these values apply only to these particular conditions, they do illustrate the effect of changes in these two main variables.

It is evident that the incremental increases in yields brought about by increases in the recycle ratio must become less attractive as values of 5:1 are exceeded, although in many cases higher recycle ratios can be justified. Recycle ratio, as used in Fig. 1, is defined as being the weight of total furnace feed divided by the weight of net fresh feed (free from ethane and lighter), and is based on the volume and composition of the gas available in the summer season. Since the volume and weight of total feed (but not fresh feed) were assumed to remain the same in all seasons of the year, the recycle ratio in the other seasons is higher than is indicated due to a decrease in the butane content of the poly feed stock during the intermediate and winter seasons. In determining the potential gasoline producing ability of a unit, the on stream time as well as the stream day production must be taken into account. Since the on stream time of a thermal polymerization unit operating at a given pressure is determined to no small degree by the recycle ratio, this effect of recycle ratio upon on stream time and total gasoline production per year must not be neglected. The recycle ratio selected for this unit was in the order of 5:1 but is actually less than this in some cases and greater than this figure in others.





Right: Interchangers and fractionating equipment servicing the Pure Oil Co. new polymerization unit at the Smiths Bluff, Tex., refinery. Below: One end of the heater serving the polymerization unit

Pressure Regulates Yields

Gasoline yields increase with operating pressure but incremental increases in pressure above 750 lb. becomes less and less beneficial, although some improvement is still apparent as pressure is increased above 2,500 lb. per sq. in. gage. In many cases operations above 1,500 lb. per sq. in. gage are not particularly attractive because of

Control room serving the unit

the small increase in yield brought about by the additional increments of pressure above this point and due to appreciable increases in construction and operating costs after this pressure of 1,500 lb. per sq. in. gage is exceeded. A reaction pressure of 1,250 lb. per sq. in. gage was selected for this particular installation.

The effect of recycle ratio and pressure upon the character of the gasoline must also be taken into consideration. The property of the poly gasoline of most interest is its octane blending value when blended with the mixtures of cracked and straightrun gasoline which usually comprise the average refinery base stock. This value may be as much as 10 to 20 points higher than its clear octane number by the Motor Method, depending upon the character of the poly gasoline

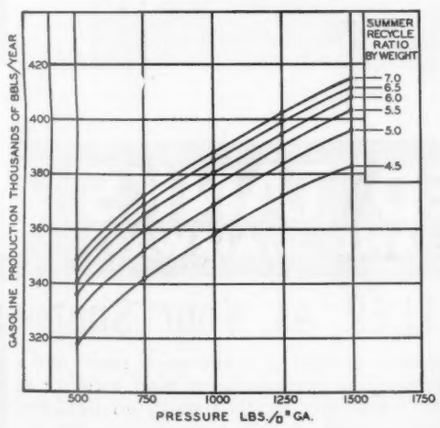


Fig. 1—Effect of recycle ratio and pressure on the annual gasoline production

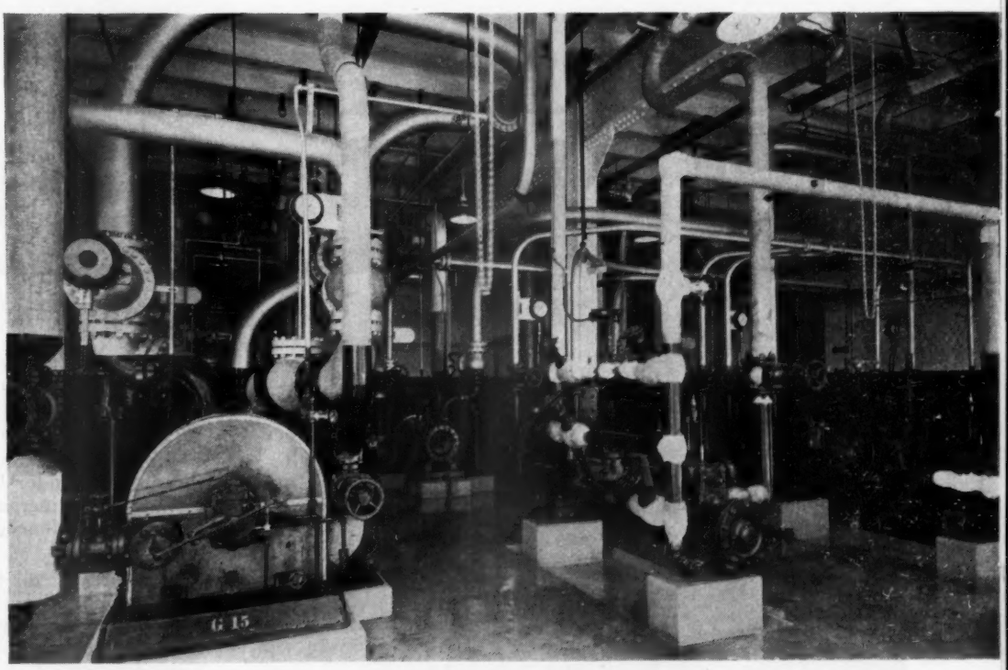
and the stock to which it is added. All of the data that have been examined indicate that the blending values of thermal poly gasolines in a particular base stock are mainly determined by the operating temperature and, to some extent, by the total polymer formed per pass, higher octane numbers being associated with high conversion temperatures and high conversions per pass. The yield and to some degree the character of the gasoline obtained from a given raw gas under definite conditions of pressure and recycle ratio depend upon the completeness of propane and butane extraction or recovery, and this effect must not be neglected. This is due in part to differences in the character of the gasoline made from propane as distinguished from that made from butanes, as well as to the higher operating temperatures necessitated by an increase in the propane content of the feed. It is, therefore, not surprising that the Motor octane number of thermal polymerization gasoline varies over a rather wide range from 76-82 and the blending value in refinery base stocks composed of straight run and cracked gasoline from 85-100.

The economic limit of propane recovery depends upon several factors, the principal ones being:

1. Cooling water temperatures.
2. Utility and fuel prices.
3. Product and raw material prices.
4. The method of propane recovery.

The refrigeration and absorption methods of feed stock recovery and combinations thereof were investigated and compared at various degrees of propane recovery. In this particular case the absorption method was selected as being most attractive and the recovery system was designed to recover, roughly, 82,000 lb. of combined feed (recycle plus fresh feed) per hour. This indicates a rather high propane recovery under conditions of low fresh feed and about 50 per cent recovery under full-load conditions.

Experience gained in observing the operations of commercial thermal poly plants demonstrated the necessity for almost complete removal of sulfur compounds from raw feed stocks as the process is rather efficient in converting hydrogen sulfide into sulfur compounds found in the boiling range of gasoline. As is well known, the addition of sulfur compounds to a gasoline decreases its octane number and its response to tetraethyl lead, and there have been cases where the addition of high-sulfur poly gasoline to refinery-base stocks has increased the amount of Ethyl fluid required to reach a definite octane number. Data developed during this survey indicated that for this particular case practically complete desulfurization of the raw gas could be justified. It must be emphasized, however, that in this instance the total sulfur content of the gasolines to which the poly gasoline is added is not in excess of 0.06 per cent by weight and this factor of total sulfur content of the refinery gasolines must be taken into consideration when determining the extent of desulfurization. Complete desulfurization had added advantages in that it minimized corrosion of the equipment and permitted the use of cheaper and, in some instances, more desirable materials of construction.

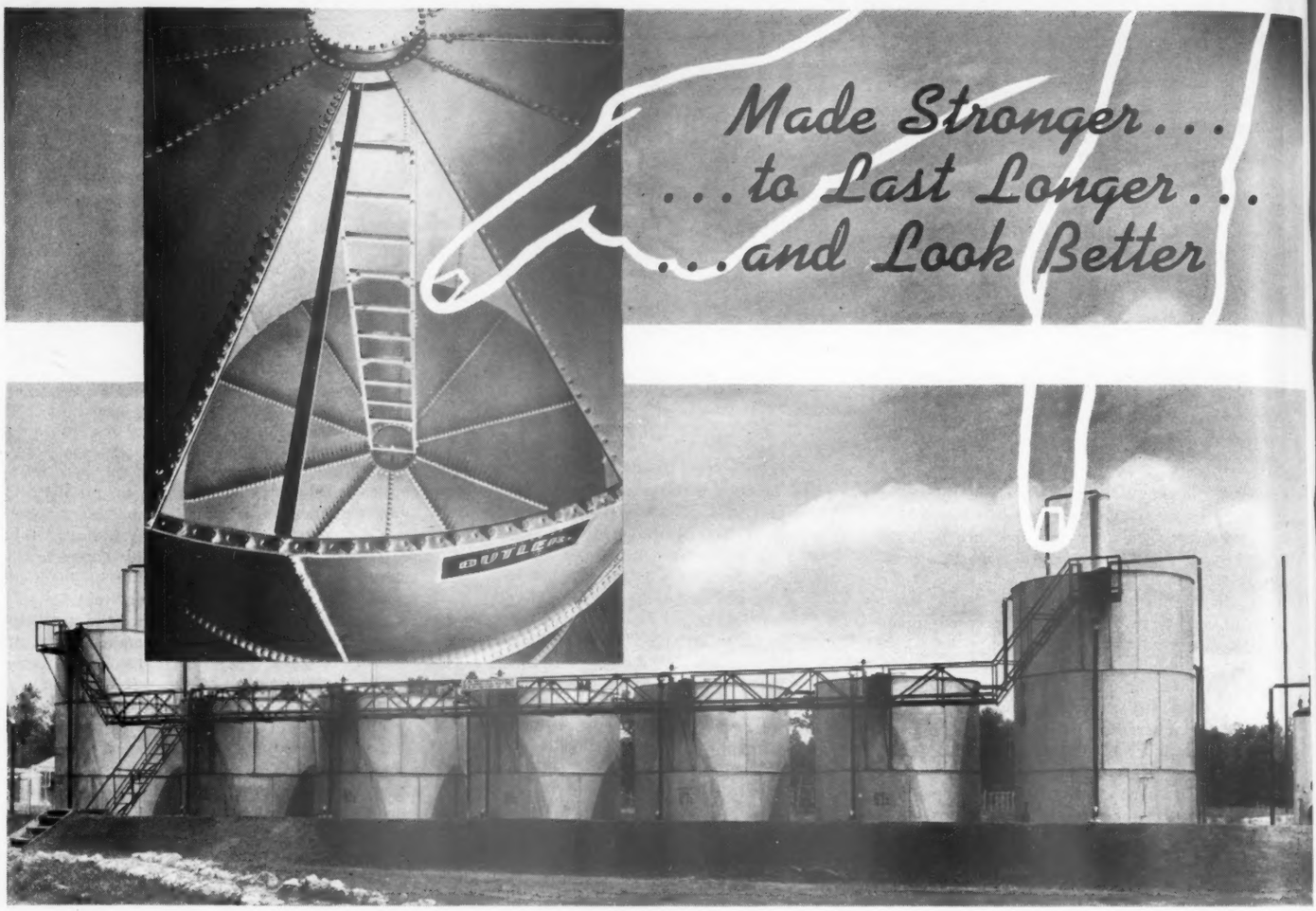


Pump room for charging and recirculating liquid fractions

Outline of Process

The Lummus Co. and Stone & Webster Engineering Corp. cooperated with Pure Oil Co. in making the survey and in the process design. Final design and construction was directed by Lummus Co., the unit being brought on stream in early June 1941. The process adopted comprises three distinct steps, i.e.:

1. Desulfurization.
2. Feed recovery and conversion.
3. Product treating and recovery.



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For the purpose of simplification the flow sheet has been broken down into the three sections indicated above and designated as Figs. 2, 3 and 4. The process operates as follows:

Desulfurization and Fresh Feed Recovery

By referring to Fig. 2 it is seen that the raw gas is brought into the plant in two streams. One stream is known as "F" gas or stabilizer feed tank gas and enters the battery limits at a pressure of 195 lb. per sq. in. and a temperature of 90° F., whereas the second stream known as stabilizer reflux gas or "R" gas enters the battery limits at 235 lb. per sq. in. gage and 120° F. The two gases are processed separately through a Girbotol unit for the removal of the hydrogen sulfide. In the Girbotol unit the two sour gas streams are

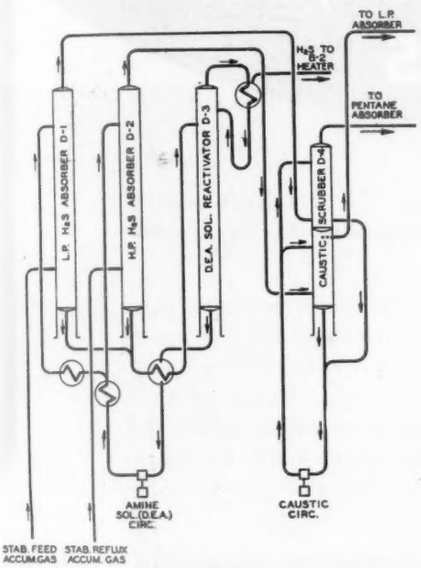

Fig. 2—Steps taken in desulfurizing vapor feed stocks

scrubbed countercurrently with aqueous diethanol amine solution, or DEA, in packed absorbers *D-1* and *D-2*. The foul solution is pumped into the reactivator tower *D-3* and the hydrogen sulfide is removed by reboiling. The reactivated DEA is returned to the process and the hydrogen sulfide is piped into the setting of the reboiler heater *B-2* and burned. The partially purified gases from which nearly all hydrogen sulfide has been removed are then washed in two packed absorbers *D-4A* and *D-4B* for the removal of the balance of the hydrogen sulfide and almost all of the mercaptans remaining in the gas. As can be seen from Fig. 3 these two purified streams of gas are then processed separately in the pentane absorber *D-5* and the low pressure absorber *D-6* for the recovery of the desired amount of propane and butane.

Recycle Recovery

A portion of the recycle is recovered in the low-pressure absorber *D-6* and the high-pressure absorber *D-7*, the balance being obtained as overhead products from the polymer flash tower *D-10* and the stabilizer *D-11*. The rich oil from all of the absorbers is preflashed in flash tower *D-8* and the partially stripped oil pumped through heater *B-2* thence into the stripper *D-9*. The stripped lean oil is used as a heating medium in certain of the exchangers and reboilers and is then cooled and returned to the absorbers. The overhead from *D-8* and *D-9* is combined in the feed tank with the overhead from *D-10* and *D-11* and this mixture comprises the feed stock for polymerization heater *B-1*. The composition of the furnace feed is adjusted by manipulating the

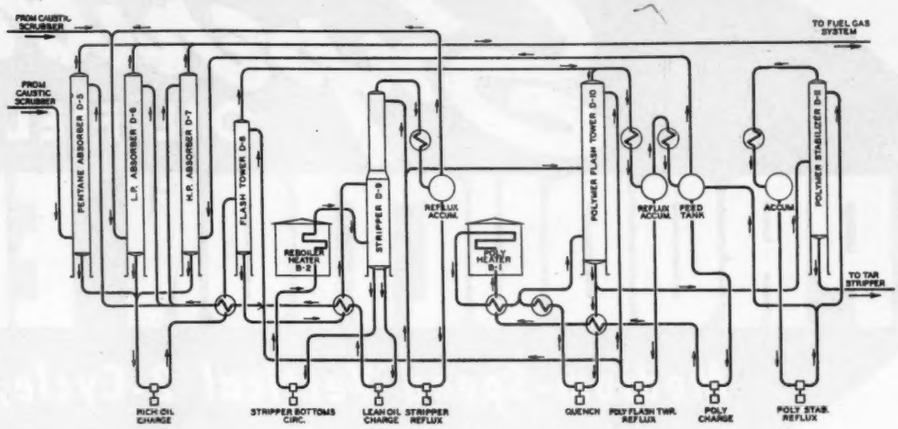

Fig. 3—Flow chart showing recovery of feed stock and its conversion

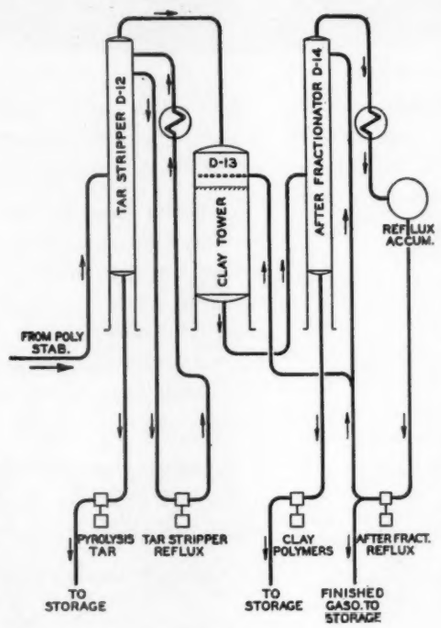

Fig. 4—Product treating and recovery

oil rates of the absorbers and the temperatures and pressures at the liquid accumulators serving fractionators *D-8*, *D-9* and *D-10*.

The furnace-charge pump takes suction from the feed tank discharging through a transfer-line heat exchanger where a considerable portion of the heat present in the reaction products leaving the soaking section of *B-1* heater is removed. The charge then flows into the *B-1* heater (the main polymerization heater), thence to the soaking section where it leaves the furnace at a temperature of 1,015°-1,060° F. depending upon the composition of the feed stock and the amount and composition of the fresh feed being processed. The outlet pressure is maintained in all cases at 1,250 lb. per sq. in. gage.

As has been indicated in the previous paragraph, the outlet products from the soaking section are partially cooled by being passed through a heat exchanger countercurrent to the cold feed. The conversion products are further cooled by being quenched with cooled *D-10* flash tower bottoms and the mixture enters *D-10* tower where practically all of the propane and a portion of the butane is taken overhead. The bottoms product is then sent to stabilizer *D-11* where the material is stabilized to the desired vapor pressure, the overhead from this tower being recycle stock which is returned to the feed tank.

The stabilized bottoms are then preheated and fractionated in tar stripper *D-12*, shown on Fig. 4, where the pyrolysis tar is removed and sent to storage. The overhead from this tower passes through the Gray process tower where it is treated in the vapor phase with clay for the removal of gum. The treated vapors and polymers pass to the after fractionator *D-14* where clay polymers are removed as a bottoms product and finished treated doctor-sweet gasoline is taken as an overhead product.

Mechanical Equipment

With few exceptions the equipment used in the construction of the unit is that usually found in nearly all refineries. However, it is believed that the solutions to some of the mechanical problems will be of interest. Operations to date have indicated that the selection of pumps and their auxiliary equipment was uniformly good. Pumps operated at low suction pressure and handling low-volatility products, such as those required in the rerun operation which handle tar, clay tower polymer, gasoline, etc., are simple reciprocating steam-actuated pumps. The pumps operating under high suction pressure and handling low-volatility products, such as the lean-oil booster pump and the reboiler circulating pump, are centrifugal pumps directly connected to steam turbines. In those cases where hot oil is being handled by these particular pumps cold lean oil is used as the sealing medium and as the means for cooling the packing. The third class of pumps which presented the most difficult problems were those pumps operating under high suction pressure and handling highly volatile materials. Some of these services are the main furnace charge, rich oil, transfer line quench and stabilizer reflux pumps. All of the pumps in this classification are driven by direct connected turbines, are fitted with double mechanical seals and provided with lubricating-oil circulation between seals at a pressure in excess of the pump suction pressure. The seal oil is circulated by four conventionally designed rotary pumps driven by direct connected turbines. The charge pump, a 14-stage 3,400-r.p.m. centrifugal, is driven by a direct connected 470-hp. condensing turbine. Complete desulfurization of the feed stock permitted a limited use of nonferrous materials for internal parts, simplifying the design of this pump. All of the turbines used in the unit are supplied with 700° F. total temperature steam, this temperature being selected after balancing investment and operating costs.

Most of the heat exchangers and condensers are of conventional design using square pitch to facilitate cleaning. The main exception to this

(Continued on Page 48)

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Size, bore x stroke, ins.	4 x 5	5 x 6	6 x 7	7½ x 8
*Effective piston displacement per revolution	125.7 cu. in.	235.6 cu. in.	395.8 cu. in.	706.9 cu. in.
Rated B. H. P.	10	20	30	50
Rated R. P. M.	700	700	600	600
Speed range, R. P. M.	400-800	350-700	400-650	400-600
Descriptive Bulletin Number	280	293	174-B	217

*Multiply this displacement by 2, to obtain equivalent displacement of a 4-cycle engine.

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New Practices Used in Laying 400 Miles of 26-In. Pipe

By PAUL REED

THE laying of 403 miles of 26-in. pipe for Natural Gas Pipeline Co. of America is one of the outstanding projects of 1941. Because of the long mileage of unusually large diameter pipe, this is the most important construction work undertaken by a natural-gas organization this year. From a national-defense standpoint it is significant because it provides expanded facilities for serving industrial areas in the Chicago territory. These will also be available for serving Wisconsin industries if the company is granted a permit to pipe natural gas into that state. For the pipe-line industry, as a whole, it represents the largest mileage and largest investment of any project started in the first half of the year.

Factory bends used in the construction of the line are an innovation attracting special attention to this project. Experience with this novel method of making bends is having an influence on plans for building large diameter gas, as well as crude-oil, lines which are considered for the near future. Other practices have been introduced into pipe lining on this project which may be applied to lines of all kinds.

By using high-tensile-strength pipe with a wall thickness as thin as ¼ in. for the main part of the line, great savings were made in steel as well as money. With less steel per mile required, it has been possible to lower costs of pipe, transportation and welding. Before leaving the mill, all pipe has been tested under pressure between two and two and a half times normal working pressures.

Specifications called for each contractor laying an average of ⅗ mile of pipe per day, but under normal conditions, when pipe deliveries were adequate, it was found that all contractors exceeded this average. Laying 1 mile per day or better was common during the building of a large part of the line. Because of the unusual thinness of the wall of this large diameter pipe it was necessary to use extra precaution while unloading from railroad cars and trucks.

The 403 miles of 26-in. pipe scheduled for construction this year represents half of the new line which the company plans to build between the Texas Panhandle and Chicago. The work has been divided in five loops, let to three contractors. W. A. Bechtel Co. has already completed 122 miles in Texas and western Kansas. Remaining work, contracted by this firm, consists of 87 miles west of Muscatine, Iowa, and river crossings in Iowa and Nebraska. Methods for laying pipe for river crossings of this project were described in an article in The Oil and Gas Journal, September 18, 1941, Page 103. A 103-mile loop and river crossings in North Central Kansas were completed within recent weeks by C. S. Foreman Co. In western Iowa, an 87-mile section of a 101-mile loop was completed early this month by O. E. Dempsey Construction Co. Work is now under way on the 28 miles on the western end of this loop which extends into eastern Nebraska. This article deals with practices observed while visiting operations of C. S. Foreman Co. and O. E. Dempsey Construction Co. Welding of sections contracted by W. A. Bechtel Co. and O. E. Dempsey Construction Co. was done by H. C. Price Co.

Loops for the 403-mile program are being laid parallel to the 24-in. line laid by Natural Gas Pipeline Co. of America in 1930 from the Texas Panhandle to Chicago.

Right: Paint gang with power-driven equipment for applying hot enamel coating and for wrapping with paper

Below: Section with overbend made of factory bends which the lowering-in gang is preparing to put into the ditch

Factory Bends

Since factory bends are of special interest now, their use on this project will be described first, before taking up the other practices.

The decision to use factory bends was reached after considering all the problems connected with thin-wall, large-diameter pipe. Bending by either the hot or cold methods commonly employed in the field changes, to some extent, the physical characteristics of the pipe. Since factory bends have never been used, there were some misgivings. But experience with putting them on this line shows that they can be handled satisfactorily and that they offer many advantages.

Factory bends came from the mill where the pipe is manufactured; they are nipples of 3½ ft. in length which are curved slightly. Five degrees of factory bends are supplied to construction crews: 1°, 2°, 3°, 4° and 5°. By combining bends

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of different types, it is possible to produce the bend required. Because of the slight curvature of individual factory bends, they are sometimes mistaken for straight nipples. In fact, when factory bends are seen for the first time in a welded line, they are sometimes mistaken for mitered bends. Unless one has visited a construction operation carried on with factory bends, it is easy to imagine numerous difficulties which are not present under actual field conditions. For one thing, the question is raised as to how factory bends of the proper types may be available at points where they are to be installed. Supplies are handled in the following manner: After the right-of-way has been surveyed to determine location and types of bends, factory bends of required types are delivered where they are needed. Stocks of factory bends, with a proper assortment, are maintained by a simple procedure.

At the beginning of work on a contract, an adequate supply of all sizes is stored at a convenient point. After the work has progressed sufficiently to indicate general conditions of the terrain in that locality, an inventory is taken to find how many of each type of factory bend have been used. This inventory governs the ordering of supplies for points ahead where the route traverses similar terrain.

During the early part of construction, engineers surveying for bends worked a quarter of a mile ahead of the tiein or pipe gang, but later they were placed a quarter of a mile ahead of the firing line. The firing line was between 1 and 2 miles ahead of the pipe gang. Engineers, surveying for bends, drive a stake near the ditch; the stake is marked to show where factory bends should be delivered and where the pipe should be cut to install them. Bends are installed by the pipe gang which is equipped with two boom tractors. Vertical loops have been used for securing slack.

Overbends, sags and sidebends are all made in the same way from the same stock of factory bends. A number of factory bends can be used together to provide the bend needed for existing conditions.

Ditching

The ditch for the 26-in. line follows a route within 100 to 150 ft. of the 24-in. line laid in 1930. For ditching, C. S. Foreman Co. used 4 ditching machines, 4 draglines and 14 air compressors for the jack hammers. Minimum width of ditch specified is 38 in. For ordinary conditions, minimum cover is 3 ft. At long water crossings, cover is 5 ft.

Welding

The firing-line method was used for the main construction work of the line.

The line is solid butt-welded throughout. Welding is done with electrodes manufactured particularly for welding high-tensile steel in all positions.

Electrodes used on the firing line are 5/32-in., $\frac{3}{16}$-in. and ¼-in. For bell-hole welding, the same electrodes are used with the exception that the last bead is made like the second bead with a $\frac{3}{16}$-in. electrode.

In the period when preparations were being made to lay this 26-in. line, a special type of welding clamp was developed for large diameter pipe. This is made so that the area of pipe surface gripped by the clamp is narrow. This facilitates holding the edges of the two ends of the pipe in the position which is desired for welding.

Bronze hammers are used by welders' helpers since it has been found that they are less likely to injure the thin-wall pipe.

A practice has been followed of testing welds every third day when a section of pipe immediately adjacent to a weld is cut out of the pipe. From this section, 12 coupons are cut; 4 of these are tested by pulling, 4 are tested by bending and 4 are nick-tested.

Cutting of pipe in the field has been improved by equipment developed by C. S. Foreman Co., which eliminates trouble due to chain slippage experienced with conventional devices.

Last year an attempt to correct chain slippage was made by installing a track. This year, this organization built a cutting machine which substitutes a wide canvas belt for the chain. The new machine has proved to be simple and satisfactory.

It has been found that inspection of welds can be aided by the use of a mirror on a long handle. A rear-vision mirror, with extension bar, of the kind made for trucks, is well suited for this purpose. By putting a snaphook on such mirror equipment for the purpose of fastening it to his belt, one inspector found that he had a convenient means of carrying it with him as he walked along the line. By using a mirror of this type, it was found that an inspector could see the lower part of the weld more plainly than if he crawled underneath the pipe. The mirror reflected a certain amount of light to shaded areas.

Pipe Protection

All of the pipe is thoroughly cleaned, primed and coated with hot enamel covered with bonded kraft paper. A cleaning machine, built especially for 26-in. pipe, is used. In addition to equipment for cleaning the pipe surface, rotary brushes clean the longitudinal seam. Paint pots, holding 8 to 10 bbl., are placed at intervals of 900 ft. along the right-of-way.

Kraft paper is wrapped around the pipe by power-driven wrapping machines immediately after coating has been applied and while it is still hot.

Following the wrapping operation, the coating is inspected. Breaks in the coating are spotted by a holiday detector which consists of the car battery and high-tension coil equipment, known as the "jeep," which is connected by wire to a device which looks like semicircular wire brushes that are known as "snitchers." Two snitchers are used at the same time, one for each side of the pipe. Current used is 18,000 volts with low amperage. Breaks in the pipe or holidays are spotted by the buzzing sound made when a switcher passes over them. These spots are daubed with enamel, applied outside the kraft paper and, in turn, protected by paper patches.

Pipe wrapped with kraft paper is lowered on supports, specially provided to prevent injury to coating and wrapping. During the early part of construction, these supports were made of belting, attached to frames. These were known as "lily pads." Later it was found that less injury was done when the pipe was supported on a curved steel plate, fitting the underside of the pipe, known as "dishpans." Where the backfill contains clods or broken rock, wood mats, made of wood veneer impregnated with asphalt, are wrapped around the pipe and the pipe is padded with soft dirt.

Lowering in and Backfilling

Four tractors of the largest size are used in lowering in. Where the ditch traverses slopes that indicate future trouble, due to washouts, sacks filled with soft dirt are placed around the pipe at intervals and the pipe is surmounted by

(Continued on Page 41)

Left: The "jeep," consisting of two car batteries and a high-tension coil, is trundled along the top of the pipe. Wires connect it with the two "snitchers" which detect holidays in coating

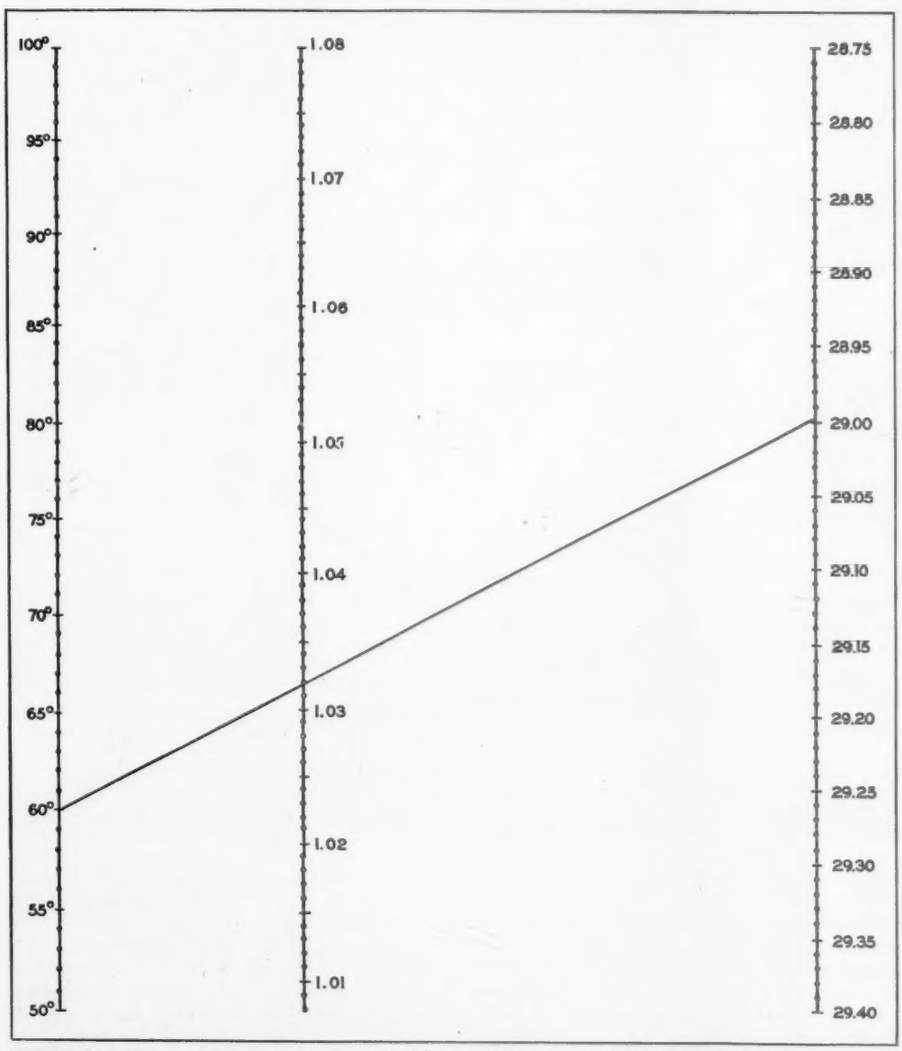
Below: The weight of a section of 26-in. pipe is sufficient to occasionally throw large tractors off balance

Correcting Engine-Test Data By Means of a Nomograph

By ROBERT O. KINSEY and
Supervisor Engine Division, National Supply Co.
ELMER ELLSWORTH BATZELL
Attorney, Washington, D. C.

NOMOGRAPHIC SOLUTION OF CORRECTION FACTOR

$$\text{Correction factor} = \frac{29.92}{\text{observed barometric pressure (inches of mercury)}} \sqrt{\frac{\text{observed temperature, °F.} + 460}{520}}$$



Example: Line representing normal conditions of 69° F. and 29 in. atmospheric pressure indicates a correction factor of 1.032

The standard rating test form (tentative) for internal-combustion power units for oil-field service of the American Petroleum Institute requires that horsepower values be computed from horsepower data obtained on test by use of the following formula:

$$H_s = \left[\frac{H_o\,(29.92)}{P}\right] \sqrt{\frac{t + 460}{520}}$$

H_s = standard brake horsepower (standard conditions of 60° F. temperature and sea-level altitude, or 29.92 in. of Hg)
H_o = observed brake horsepower
P = observed barometric pressure in inches of mercury
t = observed temperature in degrees F.

IN May 1940 the American Petroleum Institute adopted a standard rating test form for internal-combustion engines which requires that all horsepower values observed on test be corrected to conditions of 60° F. and sea-level altitude. This necessitates the constant use of a relatively simple but extremely annoying and cumbersome formula. Moreover, the degree of accuracy obtained by the ordinary slide rule is not very gratifying. A nomograph can be constructed which will greatly simplify the correction of the observed data to standard conditions.

The A.P.I. standard rating test form (tentative) for internal-combustion power units for oil-field service requires that horsepower values be computed from horsepower data obtained on test by use of the following formula:

$$H_s = H_o \times \frac{29.92}{p} \times \sqrt{\frac{t + 460}{520}}$$

H_s = standard brake horsepower (standard conditions of 60° F. temperature and sea-level altitude, or 29.92 in. of Hg)
H_o = observed brake horsepower
p = observed barometric pressure in inches of mercury
t = observed temperature in °F.

The portion of the formula

$$\left(\frac{29.92}{p} \times \sqrt{\frac{t + 460}{520}}\right)$$

may be considered as a correction factor by which the observed brake horsepower must be multiplied to derive the standard brake horsepower. In order to facilitate this essentially simple but somewhat onerous calculation, it is possible to prepare a nomograph covering all the barometric pressure and temperature ranges likely to be encountered at any specific location where tests are made.

Inasmuch as engine tests are usually conducted indoors, the temperature range will seldom vary beyond a maximum of 100° F., or a minimum of 50° F. Assuming an elevation above sea level of 1,000 ft., average barometric pressures will ordinarily range well above 28.75 and below 29.40 in. of Hg. On the basis of these maximum and minimum ranges, the correction factor would vary between 1.00786 and 1.07998.

To prepare the nomograph for the equation:

$$f = \frac{29.22}{p} \sqrt{\frac{t + 460}{520}}$$

in which f represents the correction factor and the other symbols, p and t, as defined above, it is necessary to construct three logarithmic scales. The t-axis, or temperature scale, will represent $29.92 \times \sqrt{1/520} \times \sqrt{t + 460}$, the range of t being from 50 to 100. The p-axis, or pressure scale, will represent values of p from 28.75 to 29.40. The f-axis, or correction-factor scale, will represent

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CROSS-SECTION and FIELD DATA . . . . of Active Oil Areas

Southern San Joaquin Valley, California

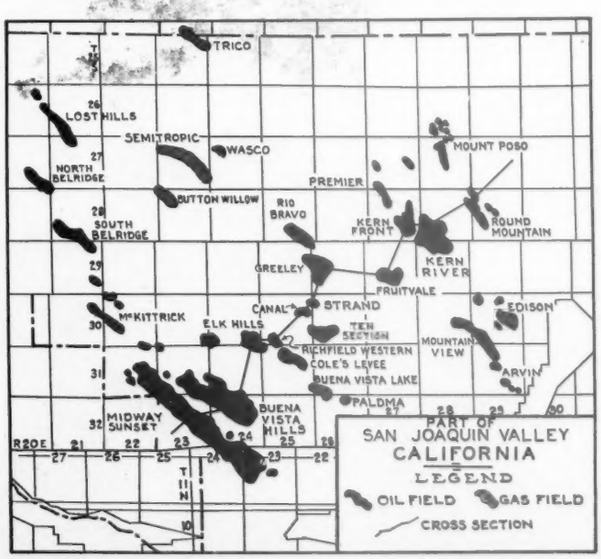
(Compiled by The Oil and Gas Journal)

LOCATION: The San Joaquin and Sacramento valleys comprise a single trough between the coast ranges of California and the Sierra Nevada. The north end of the trough is formed by the truncated ends of the intermediate ranges or the Klamath Mountains, which are largely submerged by the great lava flows of the Columbia Valley, while the south end is a complexly folded and faulted area traversed by spurs of the Coast Range. Two sections of the valley produce oil or gas, the large productive area at the south end and a smaller gas-producing area just east of San Francisco.

GEOLOGICAL HISTORY: From the standpoint of oil geology, all of the deposits laid down before the Cretaceous may be considered as a unit, generally referred to as the basement complex. During the Jurassic, the whole area was complexly folded and great masses of volcanic rock were intruded. Scattered seepages in the Jurassic formations of northern California indicate that the older sediments once contained oil, but it is doubtful whether they would yield commercial quantities at this time.

During the Cretaceous, great thicknesses of sediments were deposited, and these contain commercial quantities of gas in the northern part of the San Joaquin Valley and some oil, particularly near Coalinga. Their great depth has prevented much prospecting, except along the margin of the valley. As can be seen in the accompanying cross-section, the Cretaceous is below 15,000 ft., even in the Midway-Sunset field. Beginning with the Eocene the major structural movements died down and the record of the Great Valley is one of filling with marine and continental sediments, the oldest and youngest series being predominantly continental. In the deeper part of the basin, Eocene sediments are about 5,000 ft. in thickness and are followed by an equal thickness of Oligocene and lower Miocene marine deposits and a greater thickness during middle and upper Miocene times.

During the Pliocene, much of the valley was filled to sea level so that a portion of the sediments, particularly along the east side, was laid down in fresh water or was deposited as alluvial fans and the youngest formation, the Tulare, is also nonmarine.



Oil and gas map of part of the San Joaquin Valley showing location of cross-section

STRUCTURE: The valley, being a predominantly negative area, has subsided throughout Tertiary and Recent times, while the mountains surrounding the southern end have been as continually uplifted to provide the sediments which were deposited in the trough. This continuous movement has given rise to a variety of structures, formed at different periods. Some structures are formed by a continuation of anticlines in the coast ranges and where crossfolding has taken place elongated domes result. In some cases, such as Kettleman Hills, most of the folding has taken place so recently that the upper formations are almost as strongly folded as the lower beds. Many structures, particularly in the deeper parts of the basin, where the influence of the rising walls has been weaker, are not reflected in the younger beds and can be found only by geophysics or by haphazard drilling.

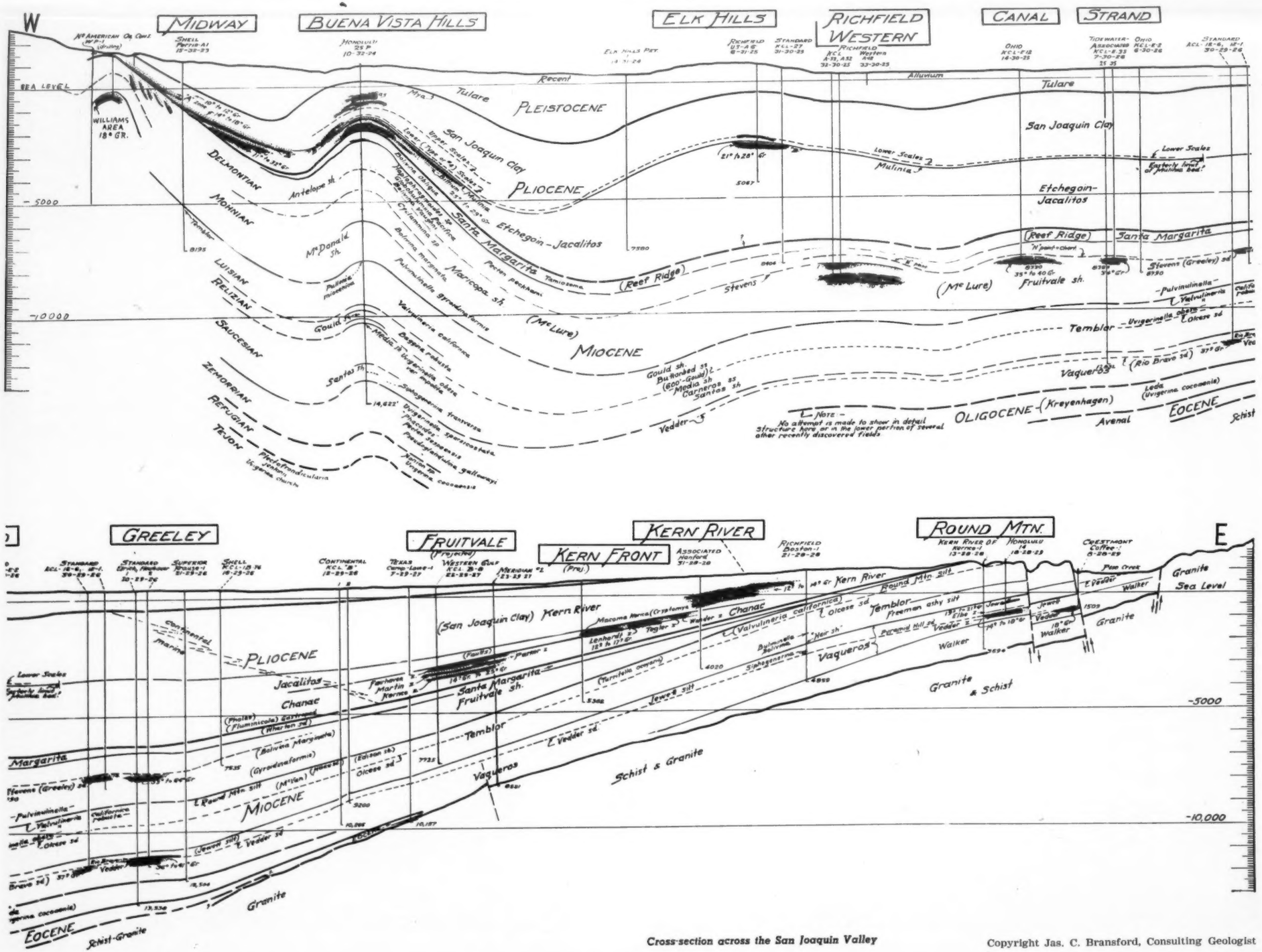
DEVELOPMENT: The search for oil began on the margin of the valley. In 1887 McKittrick was discovered practically in the foothills of the Coast Range. Twelve years later, production was found at Kern River on the east side, with Coalinga and Midway-Sunset coming in on the west side soon after. In 1910 Lost Hills was brought in farther out in the valley, followed by North and South Belridge. Fruitvale was discovered in 1928, but the fields which now extend completely across the valley were not discovered until some years later following extensive geophysical prospecting in the deeper part of the basin.

The chain of oil fields portrayed in the accompanying section is not duplicated either to the north or south, most of the production in the deeper part of the basin being gas. However, Wasco to the north produces from the Vedder (Miocene) at 13,000 ft. and Paloma produces distillate from the Stevens zone (Miocene) at 10,000 ft. so that possibilities for the valley are far from exhausted.

For years there has been a theory that Coalinga marked the farthest north for oil development but in recent months a new field has been found at Raisin City, some 35 miles northeast of Coalinga, and, even more recently, gas and oil are reported at Helm, between the two fields.

POSSIBILITIES: The oil-producing area of the San Joaquin Valley comprises 3,935 sq. miles of which 215 sq. miles are proven for production. Total production has been nearly 2,400,000,000 bbl. and estimated reserves are 2,100,000,000 bbl., making an estimated ultimate average production of 32,600 bbl. an acre.

The accompanying cross-section shows the distribution of pay zones throughout a number of fields in the valley. Farther north, the Temblor zone of middle Miocene age produces in several fields, including Kettleman Hills. In Northeast and Southeast Coalinga and in Kettleman Hills, the Avenal (Eocene) zone also produces. In addition to the structures, there are producing wedge edges or stratigraphic traps on both flanks of the basin, notably in the Pliocene. Some of these wedge edges are in continental deposits indicating lateral movement updip from marine beds. A number of other wedge edges may be expected, notably in the Oligocene and Eocene well down the east flank.



Cross-section across the San Joaquin Valley

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Photograph by Robert Yarnall Richie

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values of f from 1 00786 to 1.07998, or the quotient of the t-axis divided by the p-axis. The nomograph can be of any convenient height and width.

The first step is to apply a logarithmic scale to the t-axis containing the logs of the values of t within the range of the equation; that is, the scale must read from log 29.92 minus one half log 520 plus one half log (50 + 460) to log 29.92 minus one half log 520 plus one half log (100 + 460). The logarithms will therefore range from 1.471745 to 1.492054.

The location of intermediate points on the t-axis, corresponding to whatever values of t are desired, may be determined by proportion. If X represents any intermediate value, its height in inches, h, on the t-axis would be derived as follows:

$$\frac{h \text{ inches}}{20 \text{ in.}^*} = \frac{\log X - 1.471745}{1.492054 - 1.471745}$$

$$h = 20\ (\log X - 1.471745) \div (1.492054 - 1.471745)$$

$$h = 20\ (\log X - 1.471745) \div 0.020309$$

$$h = 20\ (\log X - 1.471745) \times 49.23925353 \text{ (reciprocal of } 0.020309)$$

$$h = 984.7850706\ (\log X - 1.471745)$$

*Any length scale may be used, in which case whatever figure is desired may be substituted for the 20 in. used above.

Assuming that it is desired to indicate on the t-axis points corresponding to 5° intervals from 50° to 100°, the procedure is as follows:

t	$t + 460$	Log $(t + 460)$ / 2	Log X, or 0.5 log $(t + 460)$ plus log 29.92 minus 0.5 log 520	Log X — 1.471745	h (In.)
50°	510	1.353785	1.471745	0.0000000	0.000
55°	515	1.3559035	1.4738635	0.0021185	2.086
60°	520	1.3580015	1.4759615	0.0042165	4.152
65°	525	1.3600795	1.4780395	0.0062945	6.199
70°	530	1.362138	1.480098	0.008353	8.226
75°	535	1.364177	1.482137	0.010392	10.234
80°	540	1.366197	1.484157	0.012412	12.223
85°	545	1.3681985	1.4861585	0.0144135	14.194
90°	550	1.3701815	1.4881415	0.0163965	16.147
95°	555	1.3721465	1.4901065	0.0183615	18.082
100°	560	1.374094	1.492054	0.020309	20.000

The t-axis may then be marked off at heights as shown in the last column above. Other intermediate points may be located by the same process.

The second step is to apply a logarithmic scale to the p-axis, containing the logs of p ranging from 28.75 to 29.40. The logarithms will therefore range from 1.458638 to 1.468347. In determining the location of intermediate values of p a proportion is used similar to that employed for the t-axis. If X represents any intermediate value of p, its height, h, on the p-axis is derived as follows:

$$\frac{h \text{ inches}}{20 \text{ in.}} = \frac{\log X - 1.458638}{1.468347 - 1.458638}$$

$$h = 20\ (\log X - 1.458638) \div (1.468347 - 1.458638)$$

$$h = 20\ (\log X - 1.458638) \div 0.009709$$

$$h = 20\ (\log X - 1.458638) \times 102.997219 \text{ (reciprocal of } 0.009709)$$

$$h = 2059.94438\ (\log X - 1.458638)$$

Assuming that it is desired to indicate points on the p-axis corresponding to five hundredths intervals from 28.75 to 29.40 in. of Hg, the procedure is as follows:

p	log p (or X)	log X — 1.458638	h
28.75	1.458638	0.000000	0.000
28.80	1.459392	.000754	1.553
28.85	1.460146	.001508	3.106
28.90	1.460898	.002260	4.655
28.95	1.461649	.003011	6.202
29.00	1.462398	.003760	7.745
29.05	1.463146	.004508	9.286
29.10	1.463893	.005255	10.825
29.15	1.464639	.006001	12.362
29.20	1.465383	.006745	13.894
29.25	1.466126	.007488	15.425
29.30	1.466868	.008230	16.953
29.35	1.467608	.008970	18.478
29.40	1.468347	.009709	20.000

Since f is given by equation, the upper value of f corresponding to the point where the horizontal line connecting the upper value of t and the lower value of p (the t and p scales ascend in opposite directions) crosses the f-axis, is given by log f = log 29.92 minus one-half log 520 plus one-half log (100 + 460) minus log 28.75 = 0.033416. The lower value of f corresponding to the point where the horizontal line connecting the lower value of t and the higher value of p crosses the f-axis is given by log f = log 29.92 plus one-half log (50 + 460) minus one-half log 520 minus log 29.40 = 0.003398. Hence the f-axis covers values of log f ranging from 0.003398 to 0.033416, corresponding to numerical values of f ranging from 1.00786 to 1.07998.

In constructing the logarithmic scale on the f-axis, points are located by the proportion:

$$\frac{h \text{ inches}}{20 \text{ in.}} = \frac{\log X - 0.003398}{0.033416 - 0.003398}$$

$$h = 20\ (\log X - 0.003398) \div (0.033416 - 0.003398)$$

$$h = 20\ (\log X - 0.003398) \div 0.030018$$

$$h = 20\ (\log X - 0.003398) \times 33.31334532 \text{ (reciprocal of } 0.030018)$$

$$h = 666.2669064\ (\log X - 0.003398)$$

If it is desired to indicate points on the f-axis corresponding to 0.005 intervals from 1.01 to 1.08, the procedure is as follows:

f	log f (or X)	log X — 0.003398	h
1.01	0.004321	0.000923	0.615
1.015	0.006466	.003068	2.044
1.02	0.008600	.005202	3.466
1.025	0.010724	.007326	4.881
1.03	0.012837	.009439	6.289
1.035	0.014940	.011542	7.690
1.04	0.017033	.013635	9.085
1.045	0.019116	.015718	10.472
1.05	0.021189	.017791	11.854
1.055	0.023252	.019854	13.228
1.06	0.025306	.021908	14.597
1.065	0.027350	.023952	15.958
1.07	0.029384	.025986	17.314
1.075	0.031408	.028010	18.662
1.08	0.033424	.030026	20.005

The final step is to determine the position of the f-axis between the other two. The t and p axes may be placed at any convenient distance apart, the farther the better. The f-axis divides this distance in the following proportion:

$$\frac{\text{Distance from } t\text{-axis}}{\text{Distance from } p\text{-axis}} = \frac{\text{Range of } p\text{-scale}}{\text{Range of } t\text{-scale}}$$

$$\frac{\text{Distance from } t\text{-axis}}{\text{Distance from } p\text{-axis}} = \frac{1.468347 - 1.458638}{1.492054 - 1.471745} = \frac{0.009709}{0.020309}$$

The required ratio is, therefore, .009709 : .020309. Accordingly, if the distance between the t and p axes is 20 in., for example, then the distance between the t-axis and f-axis is 6.47 in., and the distance between the f-axis and p-axis is 13.53 in.

The t-axis must be placed on the left-hand side of the chart, with the f-axis ascending in the same direction. The p-axis will ascend in the opposite direction. When so arranged, the point at which a straight line connecting any two points on the t and p axes intersects the f-axis will represent the correction factor by which the observed brake horsepower is to be multiplied in order to derive the standard brake horsepower.

●

New Practices Used in Laying 400 Miles of 26-In. Pipe

(Continued from Page 39)

snow fencing, which is placed crosswise in ditch.

A rechain gang of engineers precedes backfilling operations. The rechain gang surveys the pipe line, makes profiles and prepares an inventory of welds and bends. The contractor is paid according to the data compiled by the rechain gang.

Two backfill machines and an angle dozer have been used for backfilling. Water tamping is done at all country road crossings where there is no paving. The company gives special attention to cleaning up the right-of-way. Following the bulldozer, the ground in all cultivated fields is covered, using a disk harrow. All rocks larger than 6 in. are removed.

O. E. Dempsey Construction Co. used an engine-driven boring machine extensively at long road crossings. This equipment had been developed for this organization by the late Loy Wilson.

At 10-mile intervals automatic valves are installed in the line operated by reservoir pressure which functions according to air-brake principles. Because of the sensitive control arrangement, breaks in the line on either side of the valve will result in automatically closing it. These valves are unaffected by normal fluctuations due to service demands. Such valves remain closed until opened manually.

Conclusion

Owing to the emergency conditions existing because of the national-defense program, pipe deliveries have been irregular at times. Delays have been caused on account of a situation which the pipe manufacturer, the company and the contractors had no means of controlling.

For the requirements of welding thin-wall, large-diameter pipe used in the loops laid by Natural Gas Pipeline Co. of America, a special clamp was designed which grips a narrow area at the ends of the joints being welded. Welders' helpers use bronze hammers

Increased efficiency, due to improved methods, has been a feature of this construction program. Work of all gangs in a spread has been going ahead steadily at the rate of approximately a mile per day or better when conditions were normal and pipe has been available.

The methods for facilitating the construction of large diameter pipe have been of special significance to crude-oil and gasoline-line organizations because of the plans under consideration for the construction of large diameter lines from Texas to the New York-Philadelphia areas.

Operating Ideas

Flow Indicators for Circulating Water

Successful operation of engines and compressors depends on their being properly cooled. When an open system is used, the amount of water returning to the tank is easily observed but where a closed system is employed, there is no way of gaging the amount of fluid being put through the cooling jacket. Flow indicators installed on the discharge line of each cylinder show the velocity of the water. They also make it possible to tell the condition of the water and whether it is corroding the engines.

Permanent Stand for Chemical Barrel

One Oklahoma operator has equipped his leases with chemical treaters installed on concrete bases. Storage of the chemicals is provided by building a rack made from a pair of tubular uprights set in concrete. The barrel containing the chemical, when fastened in the rack, can easily be tilted and the necessary amount of treating compound withdrawn. There is no danger of losing any of the fluid due to a workman not being careful when closing the valve.

Double Trap Eliminates Entrained Fluid

An operator had trouble with pumping engines operated on lease gas when slugs of liquid entered the manifold. A single trap was not doing the work of removing condensate from the gas so a second was installed. Drains were provided on both chambers so the trapped fluid could be removed.

Pipe Coupling for Mud Line

A contractor in the Oklahoma City field has used a modified pipe coupling to provide a means for hooking up the flow line to vibrating screen. Bolts were welded to a 9⅝-in. nipple approximately 3 ft. in length. Flanges with packing slip over the ends of the flow line and the nipple on the mud box. Tightening of the nuts on the bolts effects a leakproof seal. The steel mud box is used to decrease the velocity of the mud stream and spread it out before passing it over the vibrating screen and into the circulating pits.

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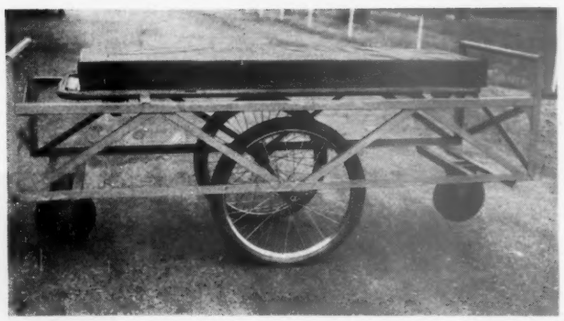


Wheeled Stretcher

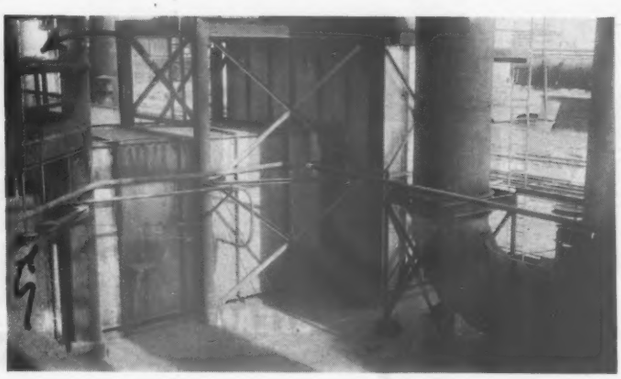
This easily handled, wheel-mounted stretcher was built to the specifications of a refinery safety director. The large central wheels are standard bicycle equipment. The stretcher proper can be removed from the frame. This equipment provides safe, comfortable and speedy transportation for an injured or sick workman.

Protect Pop Valves

These reinforced, waterproof paper caps are tied over the pop valves on tank cars to prevent dirt or other foreign matter from entering the tank and contaminating the contents. This is particularly desirable when the car is used for furnace oil. Canvas caps could be made to serve for several trips.

Regulate Dampers by Remote Control

In order to permit operator to regulate dampers and observe fire on cracking still furnace at the same time, this remote damper operating mechanism has been installed. The control wheels on the platform on the left regulate the forced air and draft dampers through cables connected to fans at the base of the stack on the extreme right.



Liquid-Level Indicator

This series of five lights beside the clock in the control room of this refinery keeps the operator constantly aware of the liquid level in the tower. A float in the tower regulates an arm in an electric contact box so that when the float rises or falls the arm switches from one contact point to another, switching on a different light or combination of lights at each point. The liquid level in the tower is indicated by the position and color of the lights. The choice of lights permit using red if danger is involved.

Walkways Over Stills

These enclosed walkways provide a safe means of escape for an operator who might be trapped on top a tower by fire. They surmount the towers of a cracking unit.

A string of cable tools—like a chain—can have "weak links" too. Efficient operation of the whole string is limited to the performance of any one tool.

When you "Specify Spang" for the entire string, you have a matched set of cable tools equal to the demands of the severest drilling or fishing job. Spang Cable Tools will *outlast,* and *outperform,* any ordinary "mixture" of tools . . . and do it *economically!*

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SPANG CABLE TOOLS

QUESTIONS ON TECHNOLOGY

By W. L. NELSON, TECHNICAL EDITOR

A Gasoline Additive

Can you give us some information on Lubri-Gas?—W. H. M.

The general status of lubricated gasolines has been discussed on Page 61 of The Oil and Gas Journal, June 19, 1941. Lubri-Gas is a copyrighted trade name for gasolines to which have been added a patented additive material. The additive material consists of a base stock of about S.A.E. 40 lubricating oil to which has been added about 10 per cent of Lubri-Gas chemicals. The additive material is mixed with the gasoline in proportions of one part of additive to 500 parts of gasoline.

Among advantages that may be claimed for this material are:

1. The chemicals contain no acids or acid derivations nor materials injurious to metal parts.

2. More effective lubrication is obtained in the cylinder or top of the cylinder by means of a lubricant in the gasoline—and hence the power output is increased and the fuel consumption is decreased.

3. More effective lubrication prevents the adherence of carbon particles to the cylinder walls and hence less wear and less difficulty with ignition occurs.

4. More effective lubrication causes lower engine temperatures — and the manufacturer has been operating a number of cars without fans, radiators or any cooling devices.

5. In road performance Lubri-Gas operates with less knock although octane-number tests do not indicate an increase in octane number.

6. By this method of application, the oil in Lubri-Gas is always new, clean oil, i.e., not contaminated with oil sludge, carbon, etc.

The operation of so-called camel cars (without radiators or fans) is an interesting experiment and would seem to substantiate at least in part the advantages enumerated above. It is claimed that engines so operated are not damaged if they are operated in the same manner as any other car, except that idling cannot be practiced for long periods of time.

Computation of Octane Number Of Natural Gasolines

We would like to know if there is a formula to calculate the octane number of natural gasoline of a given Reid vapor pressure from the fractional analysis of a sample of the natural gas.—J. D. R.

Such an equation would be only very approximate. The inaccuracies would root not so much in the method of computation as in the original inaccuracy of the fractional analysis of the gas. Such analyses cannot be depended upon to distinguish between butane and isobutane, pentane and isopentane, or between the many components which constitute the hexane-plus portion of the gasoline. R. C. Alden, on Page 110 of The Oil and Gas Journal of May 12, 1938, gives the octane numbers of various benzene-plus fractions as ranging from 57 and 66. (Probably by the motor method.) The octane numbers (C.F.R. research method) of the hydrocarbons that compose gasoline vary widely, and are somewhat as follows:

Butane	95	Neohexane	101
Isobutane	103	Diisopropyl	124
Pentane	60	Heptane	0
Isopentane	99	Isoheptane	55
Dimethyl propane	116	7 other heptanes	65 to 116
Hexane	29	Octane	−19
Isohexane	69	4 other octanes	69 to 130
3 methyl hexane	84	Nonane	−34

Little can be made of these values, particularly for hydrocarbons above the pentanes. Nevertheless, the following equation based on an inspection of these octane numbers appears to work reasonably well for Mid-Continent gasolines.

Octane number of gasoline $= 100x + 69y + 65z$

Where:

x = fraction of butanes in gasoline

y = fraction of pentanes in gasoline

z = fraction of hexane-plus in gasoline

This equation was checked against the date of Alden which appeared on Page 22 of the January 21, 1932, issue of The Oil and Gas Journal.

Reid vapor pressure	Octane numbers		
	By Alden	Computed	Error
10	64.6	65.6	+1.0
14	69.7	70.0	+0.3
18	73.3	72.3	−1.0
22	76.2	74.9	−1.3
26	78.4	77.9	−0.5
30	80.0	81.0	+1.0

Thus it appears that octane numbers could be computed from an analysis of the gas providing the gas analysis were sufficiently accurate. Care would also be necessary in ascertaining exactly which of the various laboratory methods was used in determining the octane number.

From a practical standpoint the equation given above is of little value, but it does serve to show that in a qualitative way such an equation might be devised for gasolines that are produced from a single district.

The analysis of the gasoline can be approximately related to the composition of the gas by converting the gas volumes to gallons by the general methods outlined on Pages 26 and 505 of Petroleum Refinery Engineering, McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York, N. Y.

Dupo Crude Oil (Illinois)

We would appreciate an analysis of Dupo crude oil from the Dupo, Ill., field.—D. H. D.

Dupo crude oil is a low-gravity oil obtained from St. Clair County, Illinois. Without further information than is given below the exact nature of the oil cannot be stated, but it appears to be a mixed or intermediate-base crude oil. This is indicated by the gasoline yield of 10 per cent coupled with the gravity of 31 A.P.I., and by the gravity of the fuel oil (26 A.P.I.) coupled with its viscosity of 250 Saybolt Universal at 100° F. The gravity of the distillate and of the gasoline indicates that the low-boiling products are somewhat paraffinic.

Yields from this crude by one of the companies that processes it, are:

	Per cent	A.P.I.	Notes
Gasoline	10	62	I.B.P. 140 E.P. 420
Distillate	11	46	I.B.P. 333 E.P. 618
Fuel oil	79	26	250 vis. at 100° F.

Temperatures in Storage Tanks

What are the approximate maximum temperatures in oil-storage tanks in the summertime in Texas and Oklahoma?—J. E. J.

Maximum weather temperature in typical cities of the United States, according to the U. S. Weather Bureau are:

	Highest recorded temp., °F.	Av. temp. during July, °F.
San Francisco, Calif.	101	58
Denver, Colo.	105	72
Washington, D. C.	106	77
Chicago, Ill.	105	72
Wichita, Kans.	114	79
Santa Fe, N. M.	97	69
New York, N. Y.	102	74
Oklahoma City, Okla.	113	81
Philadelphia, Pa.	106	76
Galveston, Tex.	101	83
Parkersburg, W. Va.	106	75
Cheyenne, Wyo.	100	67

Both temperatures are important because the average temperature governs the day and night temperatures to which the oil is continuously exposed, and the maximum recorded temperature indicates what extremes may be encountered at rare intervals. Thus, if the average temperature is low, the short period of extreme temperature may not last long enough to raise the temperature of the large bulk of oil to the high temperature.

The paper by C. C. Ashley, entitled "Evaporation Losses of Petroleum Oils From Steel Tanks." (before the A.P.I., Nov. 18, 1938) shows the average temperature of stored oil is about 5 per cent higher than the average air temperature, but in a few instances the oil temperature was as much as 15° higher than the atmospheric temperature. No direct relation for all tanks should be expected because different methods of insulation or cooling are employed, because evaporation tends to keep the oil temperature down, and because light-colored tanks do not absorb as much heat from the sun as black tanks.

Probable maximum liquid surfaces as used by the Chicago Bridge & Iron Works (Tech. Bull. No. 20) are as follows:

	°F.
Gulf Coast	100
Mid-Continent	115
Chicago area	100
Atlantic seaboard	100
Pacific Coast	95

Little is known about the temperature of the space above the surface of the oil. Nevertheless, it would not be expected that this temperature would greatly exceed the liquid temperature. The metal-roof surface would, however, be at a relatively high temperature because of radiation from the sun.

A "PERMANENT WAVE" IS NOT BECOMING TO THE KELLY

The Kelly bar didn't get its other name, "grief stem" for nothing. A permanent crook or bend in the Kelly makes itself felt all the way from excess wear in the crown block to fatigue failures in the drill pipe far down in the hole.

Therefore the use of Chromium-Molybdenum (4140) Steel for Kelly bars is a wise precautionary measure. This steel turns out Kellys which stay true and in balance. It has high tensile strength, with uniform properties throughout the mass. The relatively high yield point makes it safe to load the bar nearer the ultimate tensile strength limit without risking a permanent set.

In addition, Kellys made of 4140 have the hardness necessary to stand up against both manhandling and internal abrasion.

Our technical book, "Molybdenum Steels in Oil Production", describes in detail this and many other highly successful applications of Molybdenum Steels in the oil fields. It is sent free on request.

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Climax Molybdenum Company
500 Fifth Avenue, New York City

MOLY

New Thermal Polymerization Unit Installed by Pure Oil

(Continued from Page 33)

is the transfer line exchangers in which continuous coils inside of shells are used. The hot medium passes through coils which are equipped with furnace-type return bends fitted with removable plugs and the cold medium flows on the outside of these tubes. Up to the present time the operation of all exchangers has been highly successful. The unit is provided with sufficient indicating, recording and controlling instruments to afford the operators complete control of the process. For example: Instruments are available to determine and record the specific gravity of all gas streams entering and leaving the absorbers. Both heaters are controlled by automatic firemen and the temperature of the feed to the fractionators is likewise under automatic control. This adequate instrumentation has contributed in no small degree to the smooth operation that has been obtained.

Utility Consumption

In designing the unit consideration was given to the steam, water and power consumption of the polymerization unit in relation to the capacity of the existing refinery equipment for producing these utilities. The amount of cooling water required for the plant's operation was decreased by the liberal use of heat exchangers and by routing the water through the plant in such fashion that it is possible to reuse the water at several points, thus decreasing the total quantity required. The reuse of the water, of course, necessitates somewhat close control but it is not felt that this has resulted in any serious handicap. The steam consumption was decreased by superheating the steam and by the use of a condensing turbine on the main charge pump. The fuel economy of the unit was raised to an acceptable figure at a very reasonable cost by incorporating steam generating and steam superheating equipment in the furnace setting of the main polymerization heater. Typical utility consumptions for an average operation are outlined in Table 1.

TABLE 1—AVERAGE UTILITY CONSUMPTIONS

Utility—	Amount
Circulating cooling water, g.p.m.	3,175
River water for barometric condenser main charge pump, g.p.m.	850
Steam from boiler house, lb./hr.	30,000
Steam generated at unit, lb./hr.	9,650
Power consumption (lights and instruments), kw.	30
Air (instruments), cu. ft./min.	40
Fuel consumption, net B.t.u./hr.	86,400,000

Operations

Since the plant has only been in operation since June 1941, operating experience has been limited to summer operating conditions but nearly all features of the design have been completely tested. Operating conditions typical of the experience to date are shown in Table 2 while average compositions of the various gas streams and the furnace feed are outlined in Table 3. The unit was on stream 50 days during the first run and the second run was some 40 days in length, both runs being terminated for reasons other than those arising in the poly unit proper. The conversion of the C_3 and C_4 fractions into gasoline closely approaches the yields anticipated for the operating conditions employed and the utility consumptions are substantially in accordance with the design. A typical yield statement is shown in Table 4 and the tests of the gasoline, pyrolysis tar and clay tower polymers made during the same period are shown in Table 5.

The character of the gasoline is affected to some extent by the presence of gasoline recovered from the "F" gas, which in this particular case amounted to some 10 per cent of the total production.

TABLE 3—TYPICAL STREAM COMPOSITIONS
(The values expressed below are all mol per cent)

Gas stream (constituent)—	Stabilizer Feed or "F" gas	Stabilizer Reflux or "R" gas	Fresh feed	Total exit gas
Hydrogen	8.5	0.5	...	5.4
Methane	45.1	11.4	...	42.3
Ethylene	4.2	3.5	...	5.4
Ethane	17.9	26.9	...	26.9
Propylene	5.4	15.5	23.1	6.0
Propane	9.9	28.2	36.7	12.3
Isobutane	1.0	3.2	7.8	0.5
Butylene	2.2	5.4	15.8	0.3
n-Butane	3.2	4.7	15.0	0.7
Pentane and heavier	2.6	0.7	1.6	0.2
Total	100.0	100.0	100.0	100.0

TABLE 4—TYPICAL YIELD STATEMENT—BASIS 1,000,000 CU. FT. PER DAY

Item No.	Material	Bbl./day or SCF/day	Wt. %	Basis
1.	"F" gas	475,000	38.4	
2.	"R" gas	525,000	61.6	
3.	Total raw feed	1,000,000	100.0	
4.	Gasoline	89.5	26.0	Total raw feed
5.	Tar and polymers	6.6	2.6	Total raw feed
6.	Total residue gas	920,000	71.4	Total raw feed
7.	Total		100.0	
8.	Poly gasoline only	79.0	67.6	Net fresh feed
9.	Tar and polymers	6.6	7.7	Net fresh feed
10.	Residue gas	...	24.7	Net fresh feed
11.	Total net fresh feed		100.0	

TABLE 5—TYPICAL INSPECTIONS OF LIQUID PRODUCTS

	Gasoline	Pyrolysis tar	Clay polymers
Gravity, °A.P.I.	66.1	6.2	10.4
A.S.T.M. distillation, °F.:			
I.B.P.	104	417	375
5 per cent	117	461	514
10 per cent	124	474	568
20 per cent	132	506	614
30 per cent	140	526	638
40 per cent	148	569	658
50 per cent	159	617	...
60 per cent	171	645	...
70 per cent	191	680	...
80 per cent	217	...	...
90 per cent	268	...	...
95 per cent	322	...	...
End point	370	...	...
Per cent recovery	98	...	...
Per cent residue	1	...	...
Reid vapor pressure	8.6	...	...
Color—Saybolt	25	...	...
Octane No.—Motor	76.5	...	...
Octane No.—Research	90.5	...	...
Gum—A.S.T.M.	0.6	...	...
Gum—copper dish	6.9	...	...
Flash, °F. C.O.C.	...	230	295
Fire, °F. C.O.C.	...	260	345
Visc. Saybolt SU at 100° F.	...	371	...
Visc. Saybolt SU at 210° F.		49	589

TABLE 2—TYPICAL OPERATING CONDITIONS

(A) Towers

No.	Description	Service	Pressure (lb./sq. in. gage)	Temp. °F. Top	Temp. °F. Bottom
D-1	D.E.A. absorber	Removing H_2S from "F" gas	195	110	110
D-2	D.E.A. absorber	Removing H_2S from "R" gas	245	130	130
D-3	Amine reactivator	Stripping foul D.E.A.	7		221
D-4A	Caustic wash	Removing mercaptans from "F" gas	192	110	110
D 4B	Caustic wash	Removing mercaptans from "R" gas	242	130	130
D-5	Pentane absorber	Fresh feed recovery	190	110	110
D-6	Low-pressure absorber	Fresh feed recovery	230	110	110
D-7	High-pressure absorber	Recycle recovery	390	110	110
D-8	Flash tower	Partial stripping of rich oil	410	165	320
D-9	Stripper	Final stripping of rich oil	245	180	630
D-10	Polymer flash tower	Separation of total polymer	410	180	300
D-11	Stabilizer	Stabilization of total polymer	250	155	385
D-12	Tar stripper	Removal of pyrolysis tar	26	267	560
D-13	Gray tower	Clay treatment of gasoline	23	267	280
D-14	After fractionator	Removal of clay tower polymer	2	240	455

(B) Furnaces

No.	Description	Service	Pressure (lb./sq. in. gage) In	Pressure (lb./sq. in. gage) Out	Temp. °F. In	Temp. °F. Out
B-1	Polymerization heater	Convert fresh feed	1,340	1,220	450	1,050
B-2	Reboiling heater	Strip rich oil and provide reboiling heat	300	250	605	645

Conclusions

The operation of the thermal polymerization unit has increased the average summer production of gasoline at the refinery in excess of 1,000 bbl. per day and has substantially decreased the quantity of Ethyl fluid required to raise the entire refinery production of gasoline to house-brand specifications. In addition, it has among other things simplified and decreased the cost of producing a suitable base stock for "Ethyl grade" gasoline. The experience to date has indicated that the objectives established for the unit have been realized.

●

Present Paper on Heat-Resisting Alloys

The ability of alloys to carry loads at high temperatures, as in furnace parts, is usually determined for design purposes by their resistance to creep, or elongation, under conditions of constant stress at constant elevated temperatures. "Design values so determined may be unsafe under practical conditions at fluctuating temperature," declared G. R. Brophy and D. E. Furman in a paper entitled "The Cyclic Temperature Acceleration of Strain in Heat-Resisting Alloys" delivered before members of the American Society for Metals during the twenty-third annual meeting of the National Metal Congress at Benjamin Franklin Hotel, Philadelphia, Pa., October 21.

The authors, who are with the development and research division of International Nickel Co. at its Bayonne Research Laboratory, explained that they found that when the temperature fluctuates in such tests instead of remaining constant, the resistance of the material to creep is substantially reduced. The theory advanced to explain this phenomenon is that the outer layers of metal, cooling first, tend to contract and squeeze out the core, resulting in an increase in length during the cooling cycle.

Second Printing of "Fuel Flue Gases"

This is a revised edition of this book which covers a large number of diverse topics which represent a summary of the manner in which chemical work can be practically and usefully applied to everyday problems in the gas industry.

The basic laws of behavior of gases are covered in the introduction with a major portion of the book being devoted to fuel gases. The chemistry of the distribution system, atmospheres other than those composed of combustion products, gases resulting from the combustion of industrial fuels and the chemical interpretation of furnace atmospheres are also included.

The book is published by the technical section of the American Gas Association.

Pipe-Line Activity

Southeastern Pipe Line Co. Prepares to Complete System

ATLANTA, Ga.—As a result of negotiations which have been carried on, arrangements were made last week to proceed with laying pipe for 17 railroad crossings on the trunk line of Southeastern Pipe Line Co.'s system, between Bainbridge and Atlanta, Ga. It is expected that this work will be completed by Williams Brothers Corp. next week. Line will be tested and put in operation to Atlanta, Ga., by November 15. All of the right-of-way for the line has been secured as far as Atlanta.

The remainder of the gaps in the line will be laid between Atlanta, Ga., and Chattanooga, Tenn., by December 15. Work is going forward for the construction of pump stations and terminals, part of which will probably be completed by the first of the year. It will probably be February 1 before all stations are completed. Operation of the line will start at minimum capacity. The normal operating capacity of the line is approximately 30,000 bbl. per day. The line has been designed for a maximum pressure of 1,000 lb. At present the line is only operated in the 97-mile section between Port St. Joe, Fla., and Wheat Station, near Bainbridge, Ga.

Large Pipe-Line Projects Progress According to Schedule

The construction of the Plantation Pipe Line Co., Portland Pipe Line Co. and Southeastern Pipe Line Co. systems will continue according to schedule. The Plantation line, which will extend from Baton Rouge, La., to Greensboro, N. C., and is owned jointly by Standard Oil Co. of New Jersey, Standard Oil Co. of Kentucky and Shell Oil Co., is expected to be ready for operation about January 1. An article on the Plantation Pipe Line Co.'s project appears elsewhere in this issue.

The Portland Pipe Line Co. line from Portland, Me., to Montreal, owned by Jersey Standard and Imperial Oil, may be running oil by November 10, while the Southeastern system, owned jointly by Gulf Oil Corp. and Pure Oil Co., may be finished about the first of the year.

The Plantation and Southeastern lines, in the opinion of the oil industry, supply definite needs caused by the growing national-defense requirements for gasoline in the southeastern part of the United States, and will also play an important role in the oil trade after the present emergency is over, as they were planned with the utmost consideration for sound economics.

The prospect that additional pipe may not be needed for construction of eastern lines means that more material may be available for projected lines serving southwestern oil-producing areas.

Easing of East Coast Situation Affects Pipe-Line Programs

The order of the federal oil coordinator officially ending the Atlantic Coast oil "shortage" is believed to adversely affect the projected construction of a 22 and 24-in. crude-oil pipe-line system from the southwestern oil fields to the East Coast. This project was held up due to the inability of the steel mills to obtain steel with which to fabricate the necessary pipe. It was to have come up for consideration again in the next 30 days, but under present conditions there appears no possibility that it will actually be brought up again unless there is an abrupt change in the situation. Transportation of supplies to the East Coast is improved as a result of the return of 40 American-owned tankers by the British to domestic service.

With water transportation of crude and refined products from the Gulf Coast to the eastern seaboard returned to a reasonable basis, actual need for the pipe line has been lessened. This does not mean, however, that all efforts on the part of the administration to secure eventual construction of the line will be halted.

Army and Navy officials, as well as Petroleum Coordinator Harold L. Ickes, believe that the line should be constructed as a part of the national-defense program. They point out that in event the United States actually becomes involved in war, it will be extremely difficult to keep the tanker transportation line along the Atlantic Coast moving at a satisfactory rate.

The end of the East Coast shortage also will probably end all proposals for the reversal of the flow of oil in a number of gasoline lines which are now moving products from East Coast ports inland. The principal lines affected are those of the Tuscarora Pipe Line, subsidiary of Standard Oil Co. of New Jersey; Susquehanna and Sun pipe lines, owned by Sun Oil Co., and the Keystone Pipe Line Co., subsidiary of Atlantic Refining Co. The owners of these lines believe their operation in the transportation of gasoline to inland sections of Pennsylvania and New York have contributed materially toward supplying these areas during the emergency.

Globe Prepares to Test New Gasoline Pipe Line

Preparations are being made for testing the new $2,000,000 gasoline pipe-line consisting of 250 miles of 6-in. pipe extending from McPherson, Kans., to Council Bluffs, Iowa. Delays have been caused by floods, but it is expected that shipments will move through the line early in November.

Approximately 15 days will be required for testing the line; during this period 10 days will be taken in filling the line.

Gulf Prepares to Enlarge West Texas Facilities

Extension of its West Texas pipe-line system from Crane station in the Gulf-McElroy area, Texas, to the Sand Hills and McKnight area of southwestern Crane County, Texas, has been authorized by Gulf Refining Co. The extension will involve the laying of 50 miles of discharge and gravity lines.

It is the third outlet for the area, producing from both the Permian and Ordovician zones. Heretofore, it has been served by Humble Pipe Line Co. and Shell Pipe Line Co.

The Gulf outlet will consist of 18 miles of 8-in. discharge line, originating in Section 21, Block B-27, P.S.L. Survey, where the company will install two gas-engine-driven reciprocating pumping units for a daily capacity of 12,000 bbl.

The company will also lay a 5-mile 8-in. gravity line which will extend from the station site across the pool to the northeast extension area of the Permian horizon, while 23 miles of 4-in. will be laid for a loop on the west side of the structure, and for laterals.

Two-inch pipe will be employed for short feeder lines.

Gulf will erect two 80,000-bbl. storage tanks at Sand Hills station, and a single 80,000-bbl. tank at Crane station.

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Internal Constitution of the Earth

A Physics of the Earth Monograph

Edited by Beno Gutenberg
Professor of Geophysics, California Institute of Technology

413 pages, $5.00

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It covers such topics as: origin of the solar system; elastic properties of rocks and materials in the earth's crust; temperatures in the earth's crust; density, gravity, and pressure; etc. Bibliographies and references guide the reader to the best of specialized material.

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Structures of the Crust. Continents and Oceans
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Elastic Constants in the Interior of the Earth
Viscosity, Strength and Internal Friction in the Interior of the Earth
Summary.

Book Department

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Photo courtesy Axelson Manufacturing Co., Los Angeles

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FIELD DEVELOPMENTS...

HIGHLIGHTS FROM THE WEEK'S NEWS—

Completions in the United States were up 70 to establish a new high of 705 tests finaled during the past week. This is a reflection of the increased drilling activity and indicates the pressure under which field men are working to get new wells on production. It is doubtful if this pace could be continued for long with present problems of obtaining material.

Practically every area in the country showed increased activity, the only ones not recording more completions for this week than during the preceding period being Kansas, Missouri, Iowa, North Central Texas, Arkansas, Mississippi, Montana and California. Combined these states completed 41 fewer tests during the period just ended than they did last week. This shows that in the other areas, there were 121 more completions than during the previous period.

The increase in activity in Ohio, Michigan, and West Texas is noteworthy. The development in the Reed City of Osceola County accounted for most of the Michigan activity but the work in West Texas was widespread. Other areas, except those mentioned above, were at peak activity.

Study of the recent record reveals that completion of around 700 wells a week is about the peak to be expected of the drilling organizations at this time. This is revealed by the fact that after a week or two of completing over 700 tests per week, the number of completions will drop for several weeks. Delays while making contracts and awaiting the outcome of key wells take their toll. With the present available machinery the completion rate could possibly be stepped up slightly by closer coordination although this would mean an increase in expense also.

While there is some trouble obtaining material, particularly large bearings, the effectiveness of drilling organizations has not been impaired so far. The material situation is far from easy, however.

EASTERN TEXAS: Five new wildcats were announced following up several weeks of renewed interest in leasing and blocking. Two deep tests were scheduled for Leon County (p. 191).

WEST VIRGINIA: There are 70 rigs active in the Oriskany gas fields of Kanawha, Jackson and Putnam counties. The Big lime again paid off with a 200-bbl. well from a depth of 1,647 ft. in Kanawha County (p. 192).

MICHIGAN: Eleven new producing wells with initials as high as 8,400 bbl. a day were completed at Reed City, and the pool potential jumped to nearly 37,000 bbl. Exploration continued with 21 permits for drilling issued (p. 190).

KANSAS: Completion of a second producer in the Kearny County Patterson pool, which has encouraged exploration over a wide area in far western Kansas and eastern Colorado, confirmed the importance of the strike. Several discoveries were showing (p. 166).

ILLINOIS: A wildcat test in Perry County is running favorably high on structures and may indicate the opening of the country's first oil production in the near future. Another pool is in prospect in Wayne County and an offset location has been staked to a recently completed gas discovery in Clinton County (p. 165).

TEXAS GULF COAST: Two new Wilcox sand discoveries were showing in Tyler County and in the Lake Creek field of Montgomery County operators were ready to take a production test on the deepest hole ever drilled along the Texas Gulf Coast. Pipe has been set on bottom at 13,330 ft. and reports say an electrical log showed several sands between 12,000-13,000 ft. Success of a test at this interval would open a new Wilcox zone several thousand feet deeper than established production in the field. These developments tend to encourage the already widespread exploration along the Wilcox trend (p. 188).

CALIFORNIA: Completion of a wildcat in Turnbull Canyon for 125 bbl. a day insures the state of a new field, the first in a long time in the Los Angeles Basin. Wilmington remains the most active field in the basin, now having a total of 1,070 wells. Deep development is proceeding slowly throughout the area because of high cost of operations, but operators continue to drill deep holes and were ready to test at the deepest well yet drilled in the Rincon field (p. 179).

LOUISIANA GULF COAST: Ready to test was a well in the Neale field, Beauregard Parish, which is bottomed in a new Wilcox sand. If successful, the test will prove that the accumulation in this zone spreads over a wide area and holds reserves of major importance. The Erath field, Vermilion Parish, was defined to the southeast by a dry hole (p. 183).

SOUTHWEST TEXAS: Discovery of a new sand in a southwest outpost to the Sweden field of Duval County, one of the first Cockfield sand strikes, may convert the field into an important producing area. Several new producing areas and extensions were showing (p. 176).

OHIO: A rank wildcat in Muskingum County made 12,000,000 cu. ft. of gas a day, opened a new field from the second Clinton streak. It is 10 miles northeast of the prolific Brush Creek gas pool (p. 172).

PENNSYLVANIA: A well on Chestnut Ridge was making 850,000 cu. ft. of gas while still drilling at 6,805 ft. in the Onondaga chert (p. 192).

SOUTHERN WEST TEXAS: Tests in the Sand Hills extension area, Crane County, continued despite an apparent failure from the Ellenburger lime to the south (p. 168).

COLORADO: No completions during the week but activity was continuing with 20 tests reported in progress. Most of the work was in Moffat and Rio Blanco counties (p. 174).

WYOMING: A Leo sand completion in the Lance Creek field was the best of the week. A dry hole and a small producer were added in the Osage field of Weston County (p. 174).

NORTHWEST NEW MEXICO: A 40-ft. saturated sand zone in the Farmington formation at 940-80 ft. on a Fulcher basin wildcat added interest to the state (p. 174).

MONTANA: A wildcat on the North Hiawatha dome structure picked up a show of oil in a sand in the Wasatch formation at 2,138-50 ft. but it was followed by water. An attempt was being made to extend the Cut Bank field with an outpost making 150 bbl. of oil (p. 174).

COMPLETIONS IN ALL FIELDS . . .

(Week Ended October 25, 1941)

	Oil	Gas	Dry	Total	1941 total comp. to date	1940 total comp. to date
N. Y., Pa., and W. Va.	96	36	9	141	4,865	4,605
Ohio	9	17	12	38	1,256	1,245
Indiana	5	2	5	12	417	345
Kentucky	10	4	4	18	551	485
Illinois	78	0	12	90	2,999	3,155
Michigan	21	4	9	34	740	951
Kansas	16	2	14	32	1,795	1,513
Nebraska	1	0	1	2	73	35
Missouri, Iowa	0	0	0	0	32	29
Oklahoma	15	5	19	39	1,565	1,550
Texas:						
North Central Texas	28	2	18	48	2,241	2,289
West Texas	64	0	3	67	1,863	1,577
Texas Panhandle	14	1	0	15	548	477
Eastern Texas	18	3	1	22	881	504
Texas Gulf Coast	18	0	7	25	893	985
Southwest Texas	21	1	13	35	1,531	1,757
Total Texas	163	7	42	212	7,957	7,589
North Louisiana	22	0	2	24	630	534
Louisiana Gulf Coast	11	0	5	16	712	834
Total Louisiana	33	0	7	40	1,342	1,368
Arkansas	1	1	2	4	162	142
Mississippi and Southeast	6	0	4	10	227	170
Montana	3	4	1	8	242	196
Wyoming	2	0	1	3	152	140
Colorado	0	0	0	0	27	12
New Mexico	5	0	0	5	229	524
California	16	0	1	17	918	840
Total United States	480	82	143	705	25,665	24,907
Total previous week	413	61	161	635		
Week ended Oct. 26, 1940	382	42	156	580		

Trenton Lime Production In Five Illinois Pools

The accompanying article is a condensation of a report of the Illinois Geological Survey by Dr. George V. Cohee, "Trenton Production in Illinois." The report is Illinois Petroleum No. 39 and was issued September 13, 1941.

SINCE the discovery of oil in the Devonian lime in some of the new pools in Illinois during 1940, the possibilities of production from the Trenton lime have been of considerable interest to Illinois oil men. The Trenton has produced oil for a number of years in the Westfield pool, Clark County, in southeastern Illinois, and in the Dupo and Waterloo pools, St. Clair and Monroe counties, southwestern Illinois. This formation was successfully tested in the Centralia pool in two wells during 1940, and early in 1941, development of the Trenton was started in the Salem pool. To date 87 Trenton wells have been completed in the Salem pool. These wells were deepened from the Devonian. The Trenton has also been tested in a number of small pools in the state and found to be unproductive. Production from this formation in Illinois so far has been limited to structures that have considerable closure.

The name "Trenton" as used in Illinois includes all of the strata below the Maquoketa shale to the top of the Glenwood-St. Peter sandstone. Production to date has been found only in the Kimmswick limestone, the upper member of the Mohawkian series that also includes the Plattin formation. The Mohawkian series is correlated with the Trenton and underlying Black River strata of Oneida County, New York, where the Trenton limestone was first defined.

The principal Trenton producing area east of the Mississippi River is the Lima-Indiana field which has produced oil and gas in considerable quantities from rocks of Ordovician age. Other than in Illinois small amounts of gas have been produced from the Trenton in the Cumberland saddle, southern Kentucky and in Oswego and Oneida counties, New York.

Early Production

The first Trenton production in Illinois, although noncommercial, was in 32-30n-10e, Kankakee County. A number of wells were drilled to the Trenton in this area in 1900. Of these, nine were pumped for 8 months and then abandoned. The largest well produced less than 1 bbl. daily. Depth of the Trenton was 140 ft. Contours based on elevations of the bedrock suggest an anticlinal nose extending in a southwesterly direction from the Kankakee arch. Several areas in northwestern Indiana along the Kankakee arch produced small amounts of oil from the Trenton.

Westfield Pool

The first commercial production from the Trenton in Illinois was in the Westfield pool, Clark County. The first well, drilled in 1910, was a small producer. Initial production of the well was 65 bbl., dropping to 20 bbl. in 24 hours. Depth of the producing zone was 2,395-2,445 ft. The well produced 10,000 bbl. in 10 years before being abandoned.

The Westfield pool is located on a dome on the axis of the La Salle anticline. The principal producing formation is the Westfield limestone correlated as the St. Louis-Salem limestone. The 160 ft. of Trenton closure conforms closely to that of the overlying Mississippian strata. Production is limited to the upper 50 ft. at the top of the structure.

Thirteen wells produced an estimated total of 171,000 bbl. of oil from the Trenton. Two wells are still producing an average of 3 bbl. daily. One well has produced for 20 years, the other for 22 years. Average life of Trenton wells at Westfield has been 11 years. The recovery of crude oil from the Trenton at Westfield is approximately 800 bbl. per acre.

Trenton production at Westfield is from a zone in the Kimmswick formation averaging 90 ft. in thickness. The average top of the Trenton is 2,250 ft. and to the pay 2,340 ft. Where the formation contained oil in commercial quantities the wells had little or no water. The rate of the production suggests low porosity and permeability of the producing zone. The initial production averaged about 100 bbl. per well and declined an average of 72 per cent the second 24 hours. Within 2 or 3 months the daily average production per well was 10 or 12 bbl.

Other Pools

Other pools which have obtained production from the Trenton in Illinois include the Martinsville pool, the Waterloo pool, the Dupo pool, the Centralia pool and the Salem pool.

Two of the four wells which tested the Trenton in the Martinsville pool, Clark County, obtained production. The first was drilled in 1921 on the side of the Martinsville dome, and had an initial production of 125 bbl. which declined to 10 bbl. in a short time. The well was pumped for a number of months and then stood idle approximately 3 years before being abandoned. The total production of the well was approximately 6,000 bbl. The second well to obtain production from the Trenton in the Martinsville pool was drilled during 1940 a short distance from the first well. The initial production was 4 bbl. of oil and 15 bbl. of water. Another well drilled on top of the structure reported several shows of oil in the strata penetrated above the St. Peter sandstone. The Trenton does not appear very promising for further testing in this area.

In the fall of 1920 oil was encountered in the Kimmswick lime in a well drilled for water along the anticline in the vicinity of Waterloo, and further exploration and development resulted in the discovery of the Waterloo pool. Early in 1922 some 33 producing wells had been drilled in the pool. Wells located high on structure had initial productions from 75 to 125 bbl. but soon declined to 25 or 50 bbl. a day. The last producing well in the field was abandoned in 1930. The new development in oil and gas in Illinois revived the interest in obtaining further shallow production in this area and in 1939 and 1940 new wells extended the productive area along the crest of the anticline and west of the old producing area. Initial production of the new wells ranged from 15 to 60 bbl. of oil and from 1 to 500 bbl. of salt water. The total productive area of the pool is now 230 acres.

The Dupo pool, located in the northern extension of the Waterloo anticline, was discovered in 1928. During 1929, a total of 224 oil wells was completed in the field which extended into the village of Dupo. By the end of 1933 only 57 producing wells remained in the pool. Initial production of the wells ranged from 50 to 350 bbl. and the decline in production the second 24 hours ranged from 14 to 75 per cent. Contours representing the Kimmswick lime show at least 100 ft. of closure in the pool, and production was limited almost entirely to the area of closure. Water encroached throughout the pay by 1934, and the amount produced increased so much that many wells were abandoned.

During recent oil development in Illinois additional wells have been drilled with initial production from 5 to 200 bbl. of oil and from 0 to 6,000 bbl. of water. Centrifugal pumps were installed in some of the wells to handle large volumes of fluid.

In the Centralia pool, Clinton and Marion counties, two wells are producing from the Trenton lime. Both wells were drilled in 1940 near the center of the structure and initialed 100 and 120 bbl. The top of the Trenton was reached at approximately 4,014 ft. in the two wells. Production from both wells has been small.

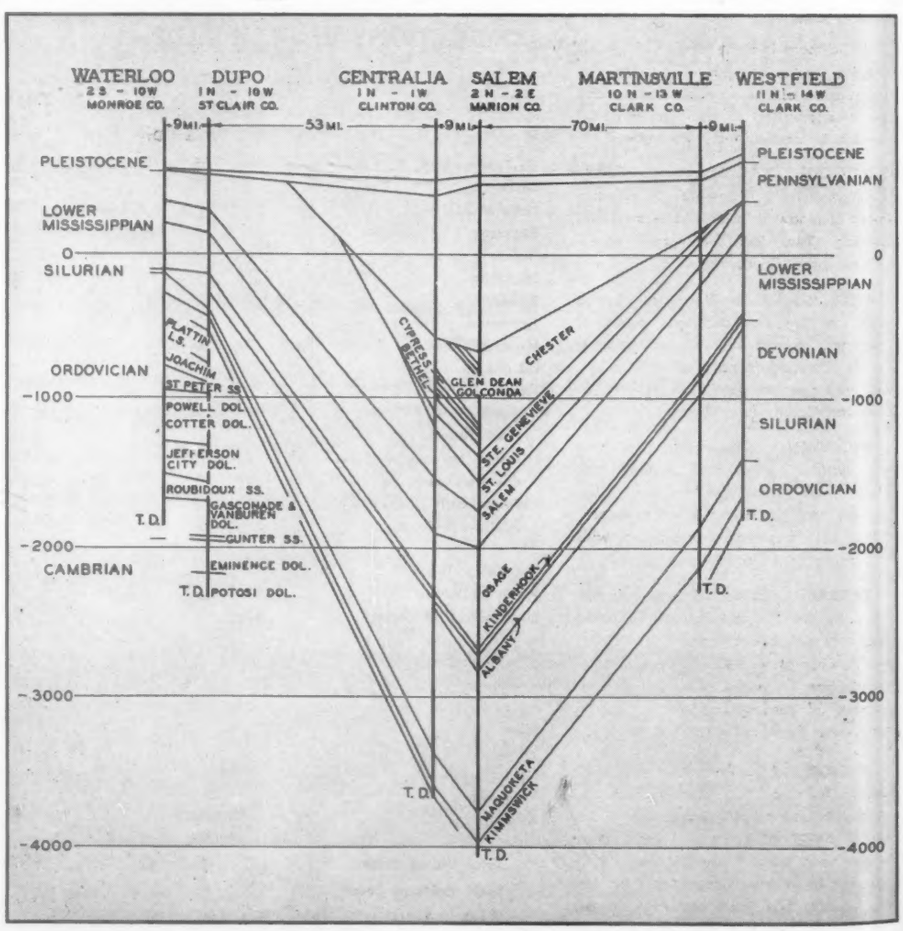
Salem Pool

The most recent Trenton development in Illinois has been in the Salem pool of Marion County. The first well to be drilled to the Trenton in this pool was completed early in 1941. Since that time 87 wells have been deepened from the Devonian lime to the Trenton. The average depth to the top of the Kimmswick lime is 4,500 ft., and the total depth of the wells averages 4,625 ft.

The largest reported initial production of any well to date was 343 bbl., and the average for all wells has been approximately 115 bbl. One of the early wells produced approximately 10,000 bbl. of oil during 50 days of operation, and a more recent well, which was drilled as an offset to other producing wells, produced a total of 4,300 bbl. in 36 days of operation.

Although the initial productions are small as compared to wells completed in more porous and permeable formations, production from these wells has been fairly stable. The decline in daily production for

(Continued on Page 166)



Cross-section from Waterloo to Westfield, Ill., taken from logs of wells drilled in areas having Trenton production

Perry County Wildcat Finds Glen Dean Running High

By STAFF CORRESPONDENT

MATTOON, Ill., Oct. 27.—Outstanding among the tests drilling at the end of the week was a wildcat test in Perry County being drilled by G. H. Blankenship, Centralia oil operator. The test, 1 Herbert H. George, NW NE SW 23-4s-1w, created a sensation when operators topped the Glen Dean at 872 ft., 57 ft. higher than the sand was encountered at unsuccessful tests drilled to the west and south about 3 miles. Preparations are now being made to core the Cypress. At present there is no production in the county but major companies hold large amounts of acreage in the area being tested by Blankenship and an immediate drilling boom is seen if the test produces as present indications point.

Two New Pools in Prospect For Wayne County

Attracting the most attention in the southeastern part of the Illinois basin was Bell Brothers 1 Fuehrer, wildcat in W½ NE NW 33-1s-6e, which recovered saturation in both the Aux Vases sand and the McClosky lime. It is being completed in the latter formation from which it produced more than 300 bbl. of oil in 20 hr. Surface casing has been set at the same operators' 2 Fuehrer, E½ SW SW 28-1s-6e.

Midway between the Johnsonville field and the Bell Brothers' discovery, Kingwood Oil Co. is preparing to complete 1 O'Neil, W½ SE SE 17-1s-6e. A drill-stem test of Aux Vases saturation yielded 120 ft. of oil-cut mud but the test was deepened to the McClosky where a drill-stem test yielded 340 ft. of oil, 160 ft. of oil-cut mud and no water.

Parkersburg and Noble Fields Extended

Richland County had three active wildcats and two of its pools were substantially extended this week by successful outpost wells.

The wildcats included the Nolf et al 1 Nuding, NW SW NW 6-4n-14w, 4 miles from production in the northeast part of the county, which has been placed on pump for a test of the McClosky lime. Its successful completion would open a large area to exploration.

Martin et al 1 Deischer, E½ NW SW 26-2n-10e, a mile southwest of the village of Parkersburg and 4 miles west and south of the Parkersburg pool, encountered saturation in the McClosky at 3,260 ft. and a drill-stem test was planned over the week end.

The third wildcat was the Pure Oil Co. 1 Miller, W½ NE SE 2-3n-9e, being deepened after exploring the Cypress sand with unannounced results.

The county's extension wells were the Pure 1 Lucas, SW NE NE 25-4n-9e, which pumped 120 bbl. from the Cypress sand to extend the Noble-Denver pool to the south; and the Ohio Oil Co. 1 Lambert, S½ SE NW 17-2n-14w, which pumped 300 bbl. of oil a day from the McClosky lime to extend the Parkersburg field 2 miles to the north.

Another extension also loomed with the recovery of saturation in the Martin et al 1 Kent, E½ SE NE 31-2n-14w, in Edwards County, now being completed about ¾ mile southeast of the Parkersburg field.

Offset Staked to Clinton Wildcat

The Texas Co. has staked location for a Benoist test in the area 4½ miles northeast of Carlyle where the firm recently completed a gas discovery well in Devonian lime which initialed at more than 17,000,000 cu. ft. a day. The new test is 2 Price Gray, SW NW SE 35-3n-2w. About 25 ft. of saturation was recovered from Benoist at 1,200-25 ft. in 1 Gray.

Carter Deep Test at Louden Nearing St. Peter

The first St. Peter sand test in the Louden field of Fayette County was drilling below 4,300 ft. over the week end possibly to reach the intended depth of approximately 5,500 ft. next week although progress was slow in the hard formations. The well, the Carter Oil Co. 6 Jennie Brauer, SE SE 21-8n-3e, encountered showings in the Trenton lime at 3,828 ft. and some oil was recovered.

Meantime the Devonian lime production of the Louden field was extended 2 miles to the northeast by the Carter 3-D Nellie Wetmore, SW NW 11-8n-3e, which is flowing approximately 300 bbl. daily and still testing. Two other Devonian wells were completed by the same company and locations were announced for five new ones.

ILLINOIS COMPLETIONS

Wildcats

Franklin County: Carter 1 Evan Sherrif, SW SE NW 28-5s-1e, dry at 2,961 ft., base Pennsylvanian 1,630 ft., Menard 1,980 ft., Vienna 2,055 ft., Tar Springs sand 2,065 ft., Glen Dean 2,128 ft., Golconda 2,263 ft., Barlow 2,326 ft., Paint Creek 2,515 ft., Benoist 2,521 ft., Renault 2,581 ft., Aux Vases 2,692 ft., Fredonia 2,750 ft., McClosky 2,759 ft.

Jungbecker et al 1 Mitchell, E½ NW NE 9-5s-4e, dry at 3,091 ft., Kincaid 1,818 ft., Menard 2,107 ft., Tar Springs 2,240 ft., Glen Dean 2,318 ft., Golconda 2,411 ft., Barlow 2,573 ft., Cypress sand 2,615 ft., Paint Creek 2,673 ft., Benoist 2,737 ft., Renault 2,774 ft., Aux Vases 2,854 ft., show oil 2,867-70 ft., Ste. Genevieve 2,914 ft., McClosky 3,013 ft., St. Louis 3,073 ft.

Torbett 1 Stuart, NE SW NE 11-6s-2e, dry at 2,896½ ft., Menard 1,971 ft., Waltersburg 2,044 ft., Vienna 2,101 ft., Glen Dean 2,184 ft., Hardinsburg 2,251 ft., Golconda 2,321 ft., Barlow 2,472 ft., Cypress sand 2,500 ft., Paint Creek 2,557 ft., Benoist 2,661 ft., Benoist sand 2,672 ft., Aux Vases 2,722 ft., Ste. Genevieve 2,762 ft., Rosiclare 2,792 ft., Fredonia 2,862 ft.

Hamilton County: Cherry & Kidd 1 R. E. Gardner, SE SE NE 24-3s-7e, pumped 125 bbl., 32-qt. shot 3,236-49 ft., Aux Vases 3,228-38 ft., T.D. 3,252 ft., *Mill Shoals extension.*

Jasper County: Great Lakes Drlg. 1 Douthit, E½ SE NW 16-5n-8e, dry at 3,144 ft., Menard 2,277 ft. Waltersburg 2,358 ft., Vienna 2,402 ft., Glen Dean 2,476 ft., Hardinsburg 2,487 ft., Golconda 2,562 ft., Barlow 2,642 ft., Cypress 2,672 ft., Paint Creek 2,784 ft., Benoist 2,833 ft., Renault 2,894 ft., Ste. Genevieve 2,969 ft., Fredonia 3,002 ft.

Saline County: Thompson 1 O. Carter, NW NE SE 16-8s-7e, dry at 2,267 ft., base Pennsylvanian 1,666 ft., lower Kincaid 1,778 ft., Palestine 1,972 ft., Menard 2,012 ft., Waltersburg 2,182 ft., Vienna 2,205 ft., Tar Springs 2,244 ft.

White County: Wall & Mitchell 1 Williams, SE NW NW 27-3s-10e, dry at 3,210 ft., Menard 2,358 ft., Tar Springs 2,475 ft., Glen Dean 2,562 ft., Hardinsburg 2,610 ft., Golconda 2,635 ft., Barlow 2,789 ft., Cypress 2,795 ft., Benoist 3,000 ft., Renault 3,038 ft., Aux Vases 3,065 ft., Aux Vases sand 3,103 ft., Ste. Genevieve 3,111 ft., McClosky 3,188 ft.

Sinclair 1 Smith, SE NW NW 24-4s-10e, dry at 3,162 ft., Menard 2,212 ft., Vienna 2,361 ft., Tar Springs 2,364 ft., Tar Springs sand 2,375 ft., Glen Dean 2,437 ft., Hardinsburg 2,487 ft., Golconda 2,526 ft., Cypress sand 2,703 ft., Benoist 2,820 ft., Aux Vases 2,960 ft., Ste. Genevieve 2,980 ft.

Fields

Albion, Edwards County: Magnolia 4 F. J. Fewkes, NW SW SW 7-2s-11e, pumped 100 bbl., 38-qt. shot 3,047-66 ft., Aux Vases 3,043 ft., T.D. 3,250 ft. P.B. 3,066 ft.

Allendale, Wabash County: Scott 2 Adams, SW SE SW 9-1n-12w, pumped 30 bbl., Cypress sand 1,988-2,000 ft., 2,014-23 ft., T.D. 2,333 ft., P.B. 2,006 ft.

Adams Corner O. & G. 4 D. Wright, NE SE SW 9-1n-12w, flowed 12 bbl., 40-qt. shot 2,010-20 ft., 60-qt. shot 2,010-20 ft., Cypress sand 1,992-2,020 ft., T.D. 2,029 ft., P.B. 2,020 ft.

Jarvis Bros. 1 Sparks, NE NW NE 36-2n-12w, location abandoned.

Benton, Franklin County: Gilliam 2 Smith, NE SE NE 23-6s-2e, pumped 140 bbl., 60-qt. shot 2,098-2,124 ft., Tar Springs 2,097 ft., T.D. 2,125 ft.

J. Menhall 4 Mosley, SW NE NE 26-6s-2e, pumped 160 bbl., 30-qt. shot 2,118-23 ft., Tar Springs 2,103 ft.

Adkins 7 C. W. & F. "W," SE NE SW 36-6s-2e, pumped 175 bbl., 100-qt. shot 2,102-24 ft., Tar Springs 2,080 ft., T.D. 2,135 ft.

Adkins 9 C. W. & F. "W," NE NW SW 36-6-2e, pumped 185 bbl., 80-qt. shot 2,096-2,133 ft., Tar Springs 2,061 ft., T.D. 2,133 ft.

Clay City, Wayne County: Pure 2 Monroe-Harrington A, W½ SW SW 1-1n-7e, pumped 58 bbl., 5,000 gal. acid, McClosky 2,997-3,003 ft., 3,020-42 ft., 3,048-51 ft., T.D. 3,058 ft.

Dale, Hamilton County: Shell 5 W. W. Daily, SW NE NE 12-6s-6e, flowed 593 bbl., 18-qt. shot 2,981-3,004 ft., Aux Vases 2,984 ft., T.D. 3,032 ft.

Pure 19 E. Cuppy, SW NW SW 6-6s-7e, flowed 809 bbl., 295-qt. shot 2,967-3,015 ft., Aux Vases sand 2,968 ft., T.D. 3,015 ft.

Grayville West, White County: Bay Pet. 1 Robinson NE SW SE 22-3s-10e, dry at 3,317 ft., base Pennsylvania 2,009 ft., lower Kincaid 2,112 ft., Menard 2,373 ft., Glen Dean 2,609 ft., Golconda 2,726 ft., Barlow 2,844 ft., Cypress sand 2,872 ft., Paint Creek 2,936 ft., Benoist 3,025 ft., Renault 3,074 ft., Aux Vases 3,130 ft., Ste. Genevieve 3,184 ft., Rosiclare 3,208 ft., Fredonia 3,244 ft., McClosky 3,249 ft.

Griffin, Wabash County: Longhorn 19 Helm, NW NE SE 22-3s-14w, pumped 190 bbl. from Benoist and Aux Vases, 50-qt. shot 2,638-50 ft., Benoist 2,632 ft., Aux Vases 2,763-74 ft., T.D. 2,774 ft.

Inman, Gallatin County: Farrall et al 2 Goebal, N½ NW NW SE 19-8s-10e, pumped 40 bbl., 15-qt. shot 2,740-53 ft., Aux Vases 2,743 ft., T.D. 2,753 ft.

Johnsonville, Wayne County: United Prod. 6 T. E. Hilliard, N½ NW NE 26-1n-6e, dry at 3,200 ft., Glen Dean 2,571 ft., Barlow 2,765 ft., Renault 3,018 ft., Aux Vases sand 3,045 ft., Ste. Genevieve 3.106 ft., McClosky 3,165-75 ft., 3,179-82 ft.

S. Mallis 1 T. Pennington, N½ SE SE 21-1n-6e, flowed 805 bbl., natural, perf. 3,174-84 ft., McClosky 3,164-82 ft., 3,191-96 ft., 3,210-14 ft., T.D. 3,225 ft.

Shell 1 Cisne State Bank, S½ SE SE 22-1n-6e, flowed 651 bbl. in 11 hr., 5,000 gal. acid, McClosky 3,141-65 ft., T.D. 3,219 ft.

Texas 1 Young-Brimberry, S½ NE SW 22-1n-6e flowed 2,216 bbl., natural, McClosky 3,168-83 ft., T.D. 3,201 ft.

Texas 2 Young-Brimberry, N½ NE SW 22-1n-6e, swabbed and flowed 300 bbl., 3,000 gal. acid, Fredonia 3,180 ft., T.D. 3,205 ft.

Paul Miller 1 Miller Gussard, E½ SW SW 23-1n-6e, flowed 2,485 bbl., 5,000 gal. acid, McClosky 3,166-84 ft., T.D. 3,199 ft.

Texas 1 D. D. Brock, S½ SE NW 26-1n-6e, swabbed 425 bbl., 3,000 gal. acid, perf. 3,107-14 ft., 3,000 gal. acid, McClosky 3,150-59 ft., T.D. 3,193 ft.

Texas 2 D. D. Brock, N½ SE NW 26-1n-6e, swabbed 173 bbl., 3,000 gal. acid, McClosky 3,150-59 ft., T.D. 3,159 ft.

Texas 1 Watson-Rodgers, S½ NW SW 26-1n-6e, swabbed 125 bbl., 3,000 gal. acid, McClosky 3,091-3,101 ft., T.D. 3,174 ft.

Texas 3 T. E. Hilliard, S½ NE NW 26-1n-6e, swabbed and flowed 300 bbl., perf. 3,164-69 ft., 3,177-80 ft., 3,154-58 ft., 3,162-68 ft., 7,000 gal. acid, McClosky 3,154-58 ft., 3,162-68 ft., T.D. 3,205 ft.

United Prod. 4 T. E. Hilliard, N½ NE NW 26-1n-6e, swabbed and flowed 300 bbl., 7,500 gal. acid, McClosky 3,153-56 ft., 3,160-71 ft., T.D. 3,201 ft.

Texas 5 M. Greathouse, N½ NE NW 27-1n-6e, flowed 1,100 bbl., natural, McClosky 3,092-98 ft., T.D. 3,124 ft.

Ohio Fuel Supply 1 Clark, S½ NE NW 28-1n-6e, flowed 624 bbl., 3,000 gal. acid, McClosky 3,191-3,201 ft., T.D. 3,201 ft.

Wiser 4-B Dickey, S½ SW SE 34-1n-6e, flowed 329 bbl., 5,000 gal. acid, perf. 3,148-60 ft., 3,198-3,203 ft., McClosky 3,148-60 ft., 3,198-3,203 ft., T.D. 3,211 ft.

Deep Rock Oil 2 K. Pennington, S½ NE NW 35-1n-6e, pumped 198 bbl., Aux Vases sand 2,997 ft., T.D. 3,164 ft., P.B. 3,005 ft.

E. J. Ruwaldt 1 J. Carriens, N½ SE NW 35-1n-6e pumped 312 bbl., 1,000 gal. acid, McClosky 3,113-16 ft., 3,117-22 ft., 3,123-33 ft., T.D. 3,136 ft.

Ruwaldt 2 Cariens, S½ SE NW 35-1n-6e, pumped 100 bbl., 1,000 gal. acid, McClosky 3,117-20 ft., 3,126-38 ft., T.D. 3,154 ft.

Deep Rock Oil 1 J. J. Porter, W½ NE SE 36-1n-6e, flowed 1,219 bbl., McClosky 3,190-97 ft., 3,215-30 ft., 3,245-56 ft., T.D. 3,256 ft.

United Prod. 1 J. J. Porter, W½ SE SE 36-1n-6e, pumped 1,200 bbl., 2,500 gal. acid, reacidized 1,000 gal., McClosky 3,194-3,286 ft., T.D. 3,302 ft.

Wiser 1 V. Ellison, W½ W½ SW NE 36-1n-6e, pumped 435 bbl., 50-qt. shot 3,070-3,106 ft., Aux Vases 3,070-3,105 ft., T.D. 3,291 ft., P.B. 3,119 ft.

Mill Shoals, White County: Hudson-Hess 3 A. J. Poorman, SE NW NE 30-3s-8e, pumped 300 bbl., 60-qt. shot 3,200-25 ft., Aux Vases sand 3,190-3,225 ft., T.D. 3,225 ft.

Texas 11 A. J. Poorman, W½ SE SW 19-3s-8e, pumped 188 bbl., 20-qt. shot 3,222-40 ft., Aux Vases 3,206 ft., T.D. 3,244 ft.

Mount Carmel, Wabash County: Hayes Drlg. 1 Seibert, N½ S½ SW 16-1s-12w, pumped 100 bbl., 3,000 gal. acid, perf. 1,466-71 ft., 1,487-94 ft., 1,990-98 ft., Cypress sand 1,990-98 ft., Biehl 1,466-71 ft., 1,487-94 ft., McClosky 2,310-28 ft., 2,342-45 ft., T.D. 2,379 ft.

New Harmony, White County: Mabee 6 O. Smith, SW SW SE 4-4s-14w, flowed 167 bbl., 40-qt. shot 2,696-2,712 ft., perf. 2,552-62 ft., 2,624-30 ft., Cypress sand 2,552-62 ft., 2,616-32 ft., Benoist 2,689 ft., T.D. 2,712 ft.

Sinclair 1 Lomas, SW SE SW 14-4s-14w, pumped 165 bbl., perf. 2,223-38 ft., Aux Vases 2,856-80 ft., T.D. 2,885 ft.

Sun and Ellis 6 E. S. Jacobs B, S½ NW SW 28-4s-14w, pumped 126 bbl. oil and 15 bbl. water, 80-qt. shot 2,571-98 ft., Cypress sand 2,569-99 ft., T.D. 2,599 ft.

Tide Water 3 Bacon, NE NE SE 5-5s-14w, flowed 1,134 bbl., McClosky 2,921-30 ft., T.D. 2,931 ft.

Roland, White County: Cities Service 3 John Mount W½ SE NE 11-7s-8e, swabbed and flowed 408 bbl., Waltersburg 2,158-76 ft., T.D. 2,176 ft.

N. V. Duncan et al 1 Winfrey Comm., NW NE NE 11-7s-8e, flowed 350 bbl., Waltersburg sand 2,185 ft., T.D. 2,207 ft.

Carter 3 McGill, NW NE NE 15-7s-8e, location abandoned.

Carter 1 G. S. Knight, NW SW NW 14-7s-8e, pumped 149 bbl. oil and 10 bbl. water, 80-qt. shot 2,899-2,924 ft., perf. 2,165-69 ft., Waltersburg sand 2,169 ft., Aux Vases 2,902-12 ft., 2,914-29 ft., T.D. 2,929 ft.

(Continued on Page 178)

Second Producer Completed At New Kearny County Pool

By ROBERT INGRAM

CONFIRMED as a major regional discovery last week was the new Patterson pool in Kearny County. Stanolind Oil & Gas Co., which opened the pool from a Cherokee sand in the Pennsylvanian, brought in a second well at 1 Gropp, W½ SW SW 24-22-38w, and staked a third test at 1 Nibblock, E½ NE NE 26-22-38w, ¼ mile south of the discovery well. The new producer, which drew a swabbing potential of 218 bbl., was drilled to a total depth of 4,760 ft.

It topped the Cherokee series at 4,435 ft., and topped the pay sand, now called the Patterson sand, at 4,741 ft. Patterson sand was topped in the discovery well at 4,740 ft. Although the 1 Patterson was given a draw-down potential of 3,000 bbl. a day, it swabbed only 21 bbl. an hour on early tests and apparently the two wells were able to produce about the same amounts of oil.

Officials of the Stanolind Oil & Gas Co. in Tulsa said no plans had been made to build a pipe line to the new area. However, oil from the pool is now being shipped by truck to the refinery at Shallow Water and there appears to be a ready market for the oil. Because of the great distance of the pool from developed areas, no pipe-line construction is anticipated until development reaches a much greater stage of advancement.

SUMMARY OF COMPLETIONS

Kansas

	No.	Bbl.	Footage
Oil wells: Fields	16	8,123	44,888
Gas wells: Fields	2	*2.9	3,542
Dry holes: Fields	8		23,916
Wildcats	6		17,036
Total	32		89,382

Nebraska

	No.	Bbl.	Footage
Oil wells: Fields	1	250	2,231
Dry holes: Wildcats	1		1,779
Total	2		4,010

*Million cu. ft.

Wildcats in Barton and Ellis Counties to Test

Most promising of the wildcats drilling last week were two apparent oil strikes, one in Ellis County and one in Barton County. The Ellis County find was at Central Petroleum and Falcon-Seaboard 1 Wasinger, NE SE 20-11-18w, 4 miles west of the Burnett pool. The well topped Arbuckle lime at 3,514 ft. and cored 4 ft. of lime with saturation before drilling stopped at 3,525 ft. Casing was being set for a test.

In Barton County, Helmerich & Payne 1 Unruh, W½ SW NW 17-20-15w, 1½ miles east of the Pawnee Rock pool, filled 1,400 ft. with crude through casing perforations from Arbuckle lime below 3,799 ft. The well is to be acidized for a production test. It marks the first production for the southwest corner of Barton County, and if successful will likely prove eventually to be an extension of the Pawnee Rock pool which has been spreading out in all directions in recent months.

Good Well Brought In on Northeast Edge of Stafford Pool

Stafford County's Stafford pool, opened a year ago on the Viola lime trend west of the Zenith pool, had a big flowing well on the northeast edge last week at F. C. Hall and J. M. Kessler 1 O'Connor, W½ NE NW 14-24-12w. Drilled to 3,820 ft., total depth, the well flowed 130 bbl. the first hour and 110 bbl. the second hour from Viola lime. Initial tests indicated the well will be the best producer drilled so far in the field which now has 13 producers from Arbuckle and Viola lime.

Meantime Nelson Drilling Co. 1 Hitz, SE NW 4-24-12w, to the northwest, was making 6,399,000 cu. ft. of gas from the Viola after plugging back from a dry Arbuckle. The well topped the anhydrite at 675 ft., the Fort Riley at 1,880 ft., the Neva at 2,285 ft., Topeka at 2,977 ft., Lansing at 3,473 ft., Viola at 3,801 ft., and had the Arbuckle from 3,999-4,032 ft., total depth Seven-inch casing was set at 3,850 ft., after the hole

Outpost Between Zenith and Peace Creek Sets Casing on Viola

Meantime, in western Reno County, Simpson Oil Co. et al set casing at 1 Mrs. Payne, SW NW NE 5-24-10w, a semiwildcat 2 miles northeast of the Zenith pool and 4 miles southwest of the Peace Creek pool. Wildcats between these two pools are searching for a link along a Viola lime trend which has yielded big production at Stafford, Zenith and Peace Creek and has not been defined in an east-west direction.

The well topped the Viola at 3,834 ft., but had no saturation in a core from 3,824-39 ft., total depth. Misener sand cut in the core, which produces 2 miles to the west in 1-24-11w at Zenith, showed spotted oil stains.

KANSAS COMPLETIONS

Wildcats

Butler County: Adair & Morton 1 Lietzke, NE NW NE 3-28-5e, dry, T.D. 3,134 ft., Lansing 1,800 ft., Mississippian 2,720 ft., Arbuckle 3,119 ft.

Greenwood County: Pryor & Lockhart 1 Keller, NW NW SE 28-26-13e, dry, T.D. 1,663 ft., Bartlesville sandy shale 1,550-85 ft., Mississippian 1,610 ft.

Leavenworth County: A. & B. Pipeline 1 Coriett, SW NE 19-10-21e, dry, T.D. 1,430 ft., Oread 5 ft., base Hertha 660 ft., sand 1,358-70 ft., Mississippian 1,417 ft.

Pawnee County: Aladdin et al 1 Mull, N½ NW SE 2-20-16w, dry, T.D. 3,749 ft., anhydrite 901 ft., Fort Riley 1,935 ft., Lansing 3,308 ft., conglomerate 3,575 ft., Arbuckle 3,652 ft.

Max Cohen et al 1 English, SW SW NE 1-21-15w, dry, T.D. 3,660 ft., Viola 3,582 ft., Simpson 3,600 ft., Arbuckle 3,640 ft., at 3,642-46 ft., 413 ft. oil in hole after shot.

Rice County: Champlin 1 Radenberg, S½ SW NE 7-18-10w, dry, T.D. 3,400 ft., anhydrite 506 ft., Lansing 2,995 ft., Arbuckle 3,318 ft.

Fields

Augusta, Butler County: Cities Service 27 Feltham, SW NE SW 10-28-4e, pumped 14 bbl., Kansas City lime 2,042 ft., T.D. 2,086 ft.

Cities Service 20 Wallace, NE SE NW 11-28-4e, pumped 20 bbl., Kansas City 2,077-98 ft.

Blakeslee 1 Long, E½ NE NW 17-28-4e, pumped 50 bbl., Arbuckle 2,453-57 ft., T.D. 2,464 ft.

Cities Service 35 Varner, SE SW NE 17-28-4e, pumped 5 bbl., Kansas City 1,994-2,144 ft.

Big Creek, Russell County: Palmer 2-A Neidenthal, E½ SW SE 23-14-15w, salt-water disposal.

Bloomer, Barton County: Magnolia 8 Mueller, N½ SE NE 1-18-11w, pumped 81 bbl., Arbuckle 3,255 ft., T.D. 3,261 ft.

Burrton, Reno County: Sinclair 6 Base, NW NW SE 26-23-4w, old well deepened, old T.D. 3,593 ft., T.D. 4,492 ft., salt-water disposal.

DeMalorie-Souder, Greenwood County: Phillips 85 De Malorie-Souder, SE NW NE 11-22-10, dry, T.D. 2,212 ft., Bartlesville 2,192 ft.

Eldorado, Butler County: Cities Service 204 Wilson, SW SE NE 8-25-5e, pumped 135 bbl., Kansas City 1,985-2,034 ft.

Cities Service 205 Wilson, SW SE NE 8-25-5e, pumped 201 bbl., Kansas City 1,939-71 ft.

Ervay, Rooks County: Cities Service 1 Ervay, SE SE SE 2-10-16w, old well P.B. from old T.D. 3,495 ft., to Lansing 3,069-3,159 ft., pumped 203 bbl.

Fairport, Russell County: C. E. Liggett 2 Stewart, W½ SE SE 17-11-5w, pumped 58 bbl., Lansing 3,185-95 ft., T.D. 3,383 ft.

Gorham, Russell County: Transwestern 5 Polcyn, N½ SW NW 14-14-15w, pumped 2,651 bbl., Arbuckle 3,208 ft., T.D. 3,212 ft.

Haferman, Rice County: George C. Vance 1 Behnke, SE NE SE 1-19-10w, abandoned rig.

Hall-Gurney, Russell County: Texas 2 Goodheart, W½ NW SE 25-14-13w, pumped est. 700 bbl., Arbuckle 3,103 ft., T.D. 3,106 ft.

Keller, Greenwood County: N. C. Dunn 5 Keller, NE SE SW 22-26-13e, pumped 20 bbl., Bartlesville 1,468 ft., T.D. 1,481 ft.

Kraft, Barton County: Cities Service 4 Hogan, E½ NE NW 11-17-11w, dry, T.D. 3,430 ft., Arbuckle 3,408 ft.

Leesburgh, Stafford County: F. C. Hall 1 Mathes, W½ SW NW 7-25-12w, dry, T.D. 4,173 ft., Arbuckle 4,161 ft.

Lost Springs, Marion County: Veeder 1 Beneke, W½ NE NW 35-17-4e, dry, T.D. 2,940 ft., Arbuckle 2,921 ft.

McLouth, Jefferson County: E. V. Jackson 1 Schrader-Hass, NW SE 29-20-9e, dry, T.D. 1,551 ft., Mississippian 1,551 ft.

McLaughlin & Sons 4 Bartlett. NE SW 33-9-20e, gaged 1,900,000 cu. ft. gas, Bartlesville 1,457 ft.

Macksville, Stafford County: J. J. Lynn 1 Nagel, W½ SE SE 3-24-15w, dry, T.D. 3,844 ft., Lansing 3,631 ft.

Madison, Greenwood County: Jackman & Jackman 2 Jones, S½ NW NE 6-22-12e, dry, T.D. 1,958 ft., Bartlesville 1,830 ft.

Neidenthal, Russell County: Skelly 2-C Boxberger, E½ SW SE 12-14-15w, pumped 338 bbl., Lansing 3,028-83 ft., T.D. 3,280 ft.

Pawnee Rock, Pawnee County: British-American 1 Smith, S½ NW SE 12-2-16w, flowed 402 bbl., Arbuckle 3,814-16 ft., T.D. 3,819 ft.

Peace Creek, Reno County: Republic 1 Yost, NE SE NW 21-23-10w, dry, T.D. 3,808 ft., Viola 3,800 ft.

West Silica, Barton County: Virginia Drilling 1-B Herter, N½ NW SE 17-20-11w, pumped 248 bbl., Arbuckle 3,295-3,311 ft.

Wherry, Rice County: Holland 2 Pallister, NE SE SW 12-21-7w, pumped 200 bbl., conglomerate 3,426-39 ft.

Zenith, Reno County: T. C. Dines 3 Hunter, W½ NE NW 18-24-10w, 3,000 bbl., Viola 3,765-99 ft.

Miscellaneous

Marion County: Nebraska-Wyoming 1-A Robinson, SW SW NW 15-20-5e, gaged 1,000,000 cu. ft. gas, sand 2,068-79 ft., T.D. 2,085 ft.

Second Well at Barada Pool Running High

ST. JOSEPH, Mo., Oct. 27.—Skelly Oil Co. 2 Roesch in the new Hunton lime pool at Barada, Neb., Richardson County, ran at least 50 ft. higher on the Hunton than No. 1. This indicated a second good producer would be drilled in at the pool. Skelly, meanwhile, has started 3 Roesch. No. 1 is producing in excess of 600 bbl. daily on the pump.

Frank Power and his associates brought in 2 Albin for the second well in the pool south of Dawson, Neb., in Richardson County. Their 1 Albin was stopped by the loss of drill pipe in the hole. The new producer was swabbing oil at the rate of 12 bbl. per hour.

Most elaborate of any wildcat test in the Forest City basin is 1 Meek which the Ohio Oil Co. is drilling 11 miles south of St. Joseph and ½ mile southwest of Wallace, in Buchanan County. A laboratory trailer was called in, the first one to appear in the basin. General Geophysical Co. is drilling the well with its specially designed rotary rig.

NEBRASKA COMPLETIONS

Wildcats

Red Willow County: Smitson & Lofton 1 Lofton, NW SW 34-1-29w, location abandoned.

Lancaster County: August Krueger 1 Roe, NE SE SW SW 5-7-7e, dry, T.D. 1,779 ft., Mississippian 1,510 ft., 7-in. 1,528 ft., Hunton 1,535 ft., Viola 1,568 ft.

Fields

Richardson County: Frank Power 2 Albin, NE NW SE SE 9-1n-14e, Hunton 2,218 ft., swabbed 12 bbl. oil per hour, Hunton 2,218 ft., perf. 2,221-31 ft.

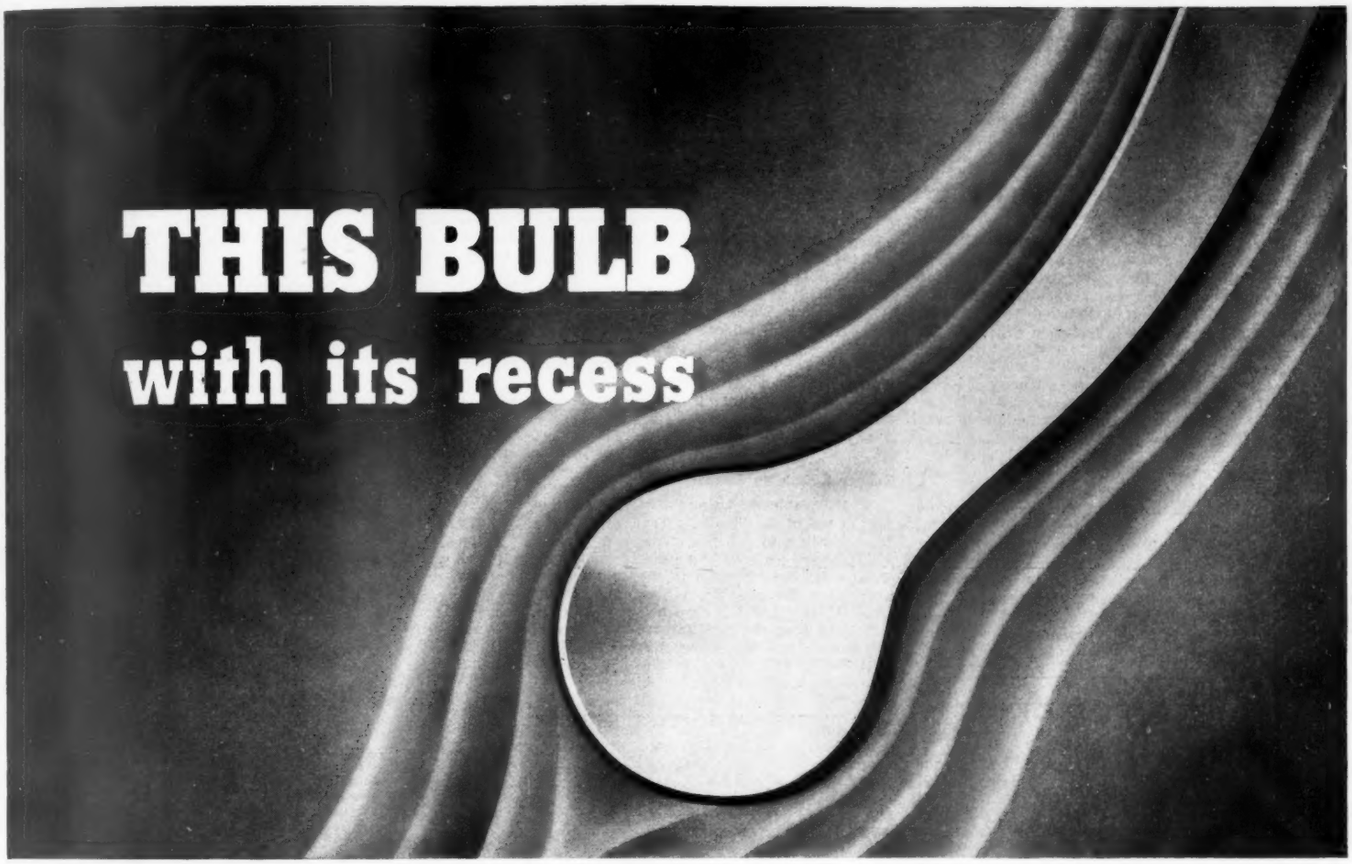
Trenton Lime Production In Five Illinois Pools

(Continued from Page 164)

the first months' operation has been in the order of 40 per cent. No water has been reported in the wells drilled within 50 ft. of structure now developed. It is expected the area of Trenton production will be about one-half that of the overlying Devonian lime which includes 5,000 acres.

Summary

Crude-oil production from the Trenton in Illinois to date represents less than 1 per cent of the state's total production. Production has been limited to the upper part of structures with considerable closure. Shows of oil have been reported in the Trenton on other structures where it has been tested but commercial production was not obtained. As the producing zone has had low porosity and permeability in the known productive areas, initial productions have been small. In the absence of early water encroachment the wells should be fairly long-lived. The recovery per acre-foot has been much less than that for other producing formations. The increased depth of the Trenton, which results in greater drilling and operation costs, makes the testing and development of this formation in the new pools less attractive. However, it is believed that in areas where the Trenton is sufficiently porous and permeable for commercial production and where the structure has sufficient closure, such testing and development is warranted although the financial return is slower and smaller than it has been with other formations.



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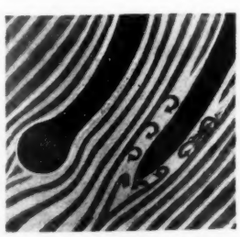

Results have been phenomenal. Peak efficiencies have moved up . . . in some cases over the 90% mark. The bulbous vane construction is stronger . . . has more wearing surface to prolong the life of the pump . . . insures maintenance of top operating efficiency over a greater period of years.

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Ellenburger Test Defines Sand Hills South Extension Area

By D. H. STORMONT

MIDLAND, Tex., Oct. 27.—The possibility of oil production from the Ellenburger, Lower Ordovician, lime south of the Sand Hills south extension area of southern Crane County was weakened this week when Continental 1 Jones, Section 12, Block 3, H.&T.C. Survey, showed sulfur water on a drill-stem test. The 20-minute test was taken from 6,010-6,146 ft. and returned 480 ft. of mud and 4,840 ft. of water.

No. 1 Jones had been deepened from 6,004 ft., where it showed for a small producer from the Simpson, Middle Ordovician, formation. The Ellenburger was topped at 6,045 ft. and, with an elevation of 3,571 ft., the test is around 500 ft. low to wells a mile north.

It is reported that operator now plans to plug back above 6,000 ft. and test the Simpson formation.

The failure of 1 Jones to find Ellenburger production has not curtailed the activity of operators in other parts of the area. Two tests were staked during the week in the link area between the Sand Hills pool proper and its south extension area. A south offset to Gulf 1-B Tubb has been staked by Shell Oil Co., Inc., as 1 Margaret Barnsley. The test is located 439 ft. from the north line and 439 ft. from the southeast line of Section 30, Block B-27, P.S.L. Survey.

SUMMARY OF COMPLETIONS

Southern West Texas

	No.	Bbl.	Footage
Oil wells: Johnson	3	2,996	12,623
Lehn	2	192	6,611
McCamey	3	9,376	8,074
McElroy	2	827	5,901
North Cowden	4	1,361	17,774
Sand Hills Permian	3	1,584	13,401
Taylor-Link	3	718	4,794
World	2	270	5,326
Other fields	10	5,075	31,546
Dry holes: Fields	2	.....	8,566
Total	34	.....	114,625

Northern West Texas

	No.	Bbl.	Footage
Oil wells: Emma	2	2,282	8,529
Slaughter	18	19,702	90,151
Wasson	9	3,360	46,924
Other fields	3	1,606	12,859
Dry holes: Wildcats	1	.....	3,389
Total	33	.....	161,852

Texas Panhandle

	No.	Bbl.	Footage
Oil wells: Fields	14	2,809	41,722
Gas wells: Fields	1	*42.5	2,900
Total	15	.....	44,622

Southeast New Mexico

	No.	Bbl.	Footage
Oil wells: Fields	5	405	14,691

*Million cu. ft.

The second test was staked by Gulf as a north offset to the firm's most recent completion in the sector, 29 Waddell. The test is 32 Waddell and location has been announced as 1,990 ft. from the west and 1,998 ft. from the south lines of Section 18, Block 3, H.&T.C. Survey.

With the prospects of increased oil production as a result of the intensified drilling campaign under way in the Sand Hills area of Crane County, Gulf Refining Co. has been given authorization to construct a 23-mile line from its Crane station in the Gulf-McElroy area to the Sand Hills area. In the field the company will lay 23 miles of 4-in. line as a gathering system, and will erect two 80,000-bbl. storage tanks. The main line will be of 8-in. pipe and will have a capacity of 12,000 bbl. This will be the third pipe-line outlet for the Sand Hills sector.

North Cowden Pool Extended

The North Cowden pool of northern Pecos County has been extended ¼ mile south. Sinclair Prairie completed 20-D J. Lee Johnson for a total daily potential of 1,408 bbl. of oil, the largest producer of the month in the pool. The test was drilled to 4,166 ft. and is located in Section 25, Block 43, T.&P. Survey.

Last month Sinclair Prairie found 1 Johnson dry at 4,341 ft. The wildcat was in Section 31, Block 42, T.&P. Survey and about ¾ mile southeast of 20-D Johnson. To the southwest, the same operators completed 21-B Johnson, Section 48, Block 43, T.&P. Survey, for 1,266 bbl. of oil daily from a total depth of 3,221 ft.

Glasscock County Wildcat Reported High on Structure

E. M. Wahlenmaier and S. C. Currie have picked up the top of the lime at 1 Texas Land Trust at 2,580 ft., according to samples. This depth places the top 180 ft. above sea level and approximately 100 ft. higher than a dry hole 3 miles to the southwest, drilled by Shell as 1 Boston. No. 1 Texas Land Trust topped the salt at 1,200 ft., checking 38 ft. higher in the formation than the Shell failure. At last reports, operators were drilling ahead below 2,703 ft. in lime. Location is 467 ft. out of the SW cor. Section 15, Block 43, T.&P. Survey.

SOUTHERN WEST TEXAS COMPLETIONS

(24-hr. rating based on last 3 hr. of 6-hr. gage)

Fields

Abell, Pecos County: Sinclair 2 Heirman, elev. 2,392 ft., 1,718 bbl., ½-in. choke, top Tulip Creek 5,085 ft., pay 5,425 ft., T.D. 5,477 ft.

Crockett, Crockett County: Gilcrease Oil Co. 13-13 University, elev. 2,327 ft., 156 bbl., 1,362 ft., T.D. 1,444 ft.

Dunes, Crane County: R. A. Barger 2-E University, elev. 2,556 ft., 347 bbl., pumping, 300-qt. shot, 2,880-3,040 ft., T.D. 3,040 ft.

Estes, Ward County: Gulf 151 Estes, elev. 2,615 ft., 397 bbl., 200-qt. shot, 2,570-2,615 ft., T.D. 2,635 ft.

Foster, Ector County: Sinclair 8 Gist, elev. 2,968 ft., 818 bbl., 460-qt. shot, 4,150-4,275 ft., T.D. 4,275 ft.

Hutchins, Ward County: Gulf 162 Hutchins, elev. 2,670 ft., 298 bbl., 470-qt. shot, 2,713-3,075 ft., T.D. 3,100 ft.

Johnson, Ector County: Sinclair 21-B Johnson, 2,990 ft., 1,266 bbl., 470-qt. shot, 4,100-4,200 ft., T.D. 4,230 ft.

Sinclair 20-D Johnson, elev. 3,030 ft., 1,408 bbl., 390-qt. shot, 4,075-4,175 ft., T.D. 4,175 ft.

Trinity Drilling Co. 2 Johnson, elev. 2,975 ft., 322 bbl., 395-qt. shot, 4,080-4,218 ft., T.D. 4,218 ft.

Jordan, Ector County: Forest Dev. 1-C W. P. Edwards, elev. 3,042 ft., dry at 4,320 ft.

Keystone, Winkler County: Standard 43-19 Baird, elev. 2,920 ft., 218 bbl., 300-qt. shot, 3,270-3,386 ft., T.D. 3,390 ft.

Lehn, Pecos County: Burk Royalty 8 Sullivan, elev. 2,422 ft., 60 bbl., ¼-in. choke, 80-qt. shot, 1,700-16 ft., P.B. from 1,885 ft.

Burk Royalty 7-C Sullivan, 132 bbl., ¼-in. choke, 80-qt. shot, 1,694-1,711 ft., T.D. 1,726 ft.

McCamey, Crane County: Gulf 28 M. F. Henderson, elev. 2,770 ft., 9,024 bbl., 5,000 gal. acid, 3,237 ft., T.D. 3,510 ft.

McCamey, Upton County: Gulf 5-C Lane, elev. 2,701 ft., 65 bbl., pumping, T.D. 2,345 ft.

Shell 14 Baker, elev. 2,579 ft., 287 bbl., 30 per cent water, pumping, 2,000 gal. acid, 2,197 ft., T.D. 2,219 ft.

McElroy, Crane County: Gulf 28 McElroy, 2,547 ft., 166 bbl., pumping, 820-qt. shot, 2,773-2,991 ft., T.D. 2,922 ft.

Gulf 254 McElroy, 2,596 ft., 661 bbl., 760-qt. shot, 2,760-2,969 ft., T.D. 2,979 ft.

North Cowden, Ector County: Stanolind 25-G Smith, elev. 3,035 ft., 346 bbl., pumping, 360-qt. shot, 4,140-4,260 ft., T.D. 4,280 ft.

M. A. Grisham 1-B G. A. Henderson, elev. 2,903 ft., 265 bbl., pumping, 305-qt. shot, 4,345-4,415 ft., T.D. 4,419 ft.

Sinclair 7 Palmer, elev. 4,246 ft., dry at 4,246 ft.

Texas 9 Holt, elev. 3,129 ft., 179 bbl., pumping, 350-qt. shot, 4,410-65 ft., T.D. 4,495 ft.

Texas 15 Holt, elev. 3,106 ft., 571 bbl., 370-qt. shot, 4,390-4,580 ft., T.D. 4,580 ft.

Sand Hills Permian, Crane County: Humble 61 Tubb, elev. 2,571 ft., 144 bbl., ½-in. choke, 2,000 gal. acid, 4,356 ft., T.D. 4,446 ft.

Humble 62 Tubb, elev. 2,616 ft., 963 bbl., 500 gal. acid, 4,370 ft., T.D. 4,535 ft.

Humble 63 Tubb, elev. 2,572 ft., 477 bbl., 500 gal. acid, 4,340 ft., T.D. 4,420 ft.

Taylor-Link, Pecos County: Burk Royalty 8 Masterson, elev. 2,422 ft., 48 bbl., pumping, 100-qt. shot, 1,422-75 ft., T.D. 1,478 ft.

H. G. Eastham 4 University, 300 bbl., pumping, 4,000 gal. acid, 1,604 ft., T.D. 1,709 ft.

Sam Letwin et al 2-E University, elev. 2,517 ft., 370 bbl., ¼-in. choke, 1,700 gal. acid, 1,590 ft., T.D. 1,607 ft.

Tobarg, Pecos County: Stanolind 13-B Smith, elev. 2,364 ft., 50 bbl., pumping, 374 ft., T.D. 388 ft.

Waddell, Crane County: Gulf 29 Waddell, elev. 2,466 ft., 977 bbl., 5,000 gal. acid, 5,638 ft., T.D. 5,647 ft.

White & Baker, Pecos County: Cardinal Oil Co. 4-J White & Baker, elev. 3,057 ft., 96 bbl., 100-qt. shot, 2,125-50 ft., T.D. 2,150 ft.

World, Crockett County: L. H. Armer 2-X Powell, elev. 2,802 ft., 74 bbl., pumping, 1,000 gal. acid, 2,646 ft., T.D. 2,659 ft.

Garrett M. Smith 2-D Powell, elev. 2,821 ft., 196 bbl., pumping, 700 gal. acid, T.D. 2,667 ft.

SOUTHERN WEST TEXAS ACTIVE WILDCATS

Crockett County: L. S. Pittman 1 Bouscaren, 467 ft. from N and W lines Sec. 29, Blk. HH, H.E.&W.T. Sur., 2,500-ft. test, S.D., orders, 1,085 ft.

Jacobs & Gibson 1 University Sur., Blk. 29, Sec. 5, 990 ft. from S and 990 ft. from E lines, drilling at 85 ft.

Culberson County: John Wolfe 1 Wilson-Briggs, 2,316 ft. from N and 1,500 ft. from E lines Sec. 1, Blk. 112, W. N. Older Sur., fishing tools 425 ft.

El Paso County: J. S. Meriwether 1 Bobadilla, 660 ft. from N and W lines, Scrap File 254, setting 8-in. casing at 265 ft., T.D. 637 ft.

Ector County: Oil Well Drilling Co. 1 J. L. Johnson, T.&P. Sur., Blk. 44, Sec. 48, Twp. 1s, 467 ft. from N and 467 ft. from W lines, 4,500-ft. test.

Glasscock County: E. M. Wahlenmaier 1 Texas Ld. & Tr., 467 ft. from W and S lines Sec. 15, Blk. 34, T.&P. Sur., 3,500-ft. test, running 7-in. casing to 2,763 ft. to replace cable tools with rotary.

Irion County: B. C. Mann 1 M. Read, NE NE Sec. 2, Blk. 17, H.&T.C. Sur., drilling at 2,527 ft.

Pecos County: J. L. Cooper 1 University, SE SE SE Sec. 13, Blk. 16, University Sur.

Cardinal Oil 1-3 University, 1,715 ft. from N and 2,370 ft. from W lines Sec. 3, Blk. 17, University Sur., set 10-in. casing at 457 ft., 7-in. casing at 1,300 ft., drilling at 1,377 ft.

Gulf 2 Millar, C NE SE Sec. 43, Blk. 11, Ordovician test, drilling 1,985 ft.

Reagan County: Amerada 1-RB University, NW NE Sec. 8, Blk. 48, University Land Sur., drilling 5,256 ft.

Amerada 1-RC University, SE NE Sec. 4, Blk. 48, University Land Sur., 2-in. tubing to 2,391 ft., perf. casing 2,377-83 ft., 750-gal. acid, swabbing, P.B. 2,790 ft.

Upton County: Plymouth 1 Alford, C Sec. 50, Blk. 12, P. B. Scott Sur., drilling 10,063 ft.

Ward County: Shell Oil 1 Sealy-Smith, 2,310 ft. from S and 330 ft. from E lines Sec. 38, Blk. A, G.M.M.B. &A. Sur., Ordovician test, drilling 6,836 ft.

Winkler County: Magnolia 20 States-Walton, NW cor. Sec., Blk. 3-B, P.S.L. Sur., drilling 8,428 ft.

Sam Weiner 1 Halley, NW NE Sec. 7, Blk. 11-B, P.S.L. Sur., S.I. 3,023 ft.

NORTHERN WEST TEXAS

In Yoakum County, the wildcat being drilled by Sinclair Prairie at 1 Kleiner, Section 436, Block D, John H. Gibson Survey, is still running high and logged the top of the brown lime at 4,320 ft. or —680 ft. This is reportedly higher than G. P. Livermore 1 Ownby, pool opener, 3½ miles to the southeast.

The outlook for another wildcat in the same county was definitely darkened this week, with Honolulu Oil Co. 1-13 Wright encountering sulfur water at 5,277 ft. Bottomed at 5,311 ft. in lime, 1-13 Wright had been bailed dry from 5,293-5,304 ft. Later 40 gal. of salt water with a scum of oil was bailed in 1 hour and 15 minutes, with a gradual increase in the water noted.

No. 1-13 Wright is 467 ft. out of the NW cor. Section 13, Block D, John H. Gibson Survey.

Improved Position for Terry County Wildcat

The American Drilling Corp. 1 Hufnall, Section 14, Block D-14, C.&M. Survey, which has been drilling structurally low to the Texas 1 Murphy, a wildcat failure 4½ miles southwest, in the northwestern part of Terry County, has encountered a thinning of section and is now flat structurally with the Texas failure. With an elevation of 3,528 ft., the top of the brown lime was picked up at 4,500 ft.

Bailey County Wildcat Test Spudded

The increased wildcatting activity in the northern basin district added another test this week, with Broderick & Calvert and Amon Carter spudding 1 G. H. Hayward, in central Bailey County. The wildcat is being drilled on an 8,000-acre block, assembled by York & Harper, to a contract depth of 5,500 ft. Location is in Labor 24, League 173, Sutton C.S.L. Survey, 9 miles southwest of Muleshoe and 25 miles northwest of production in the Slaughter field.

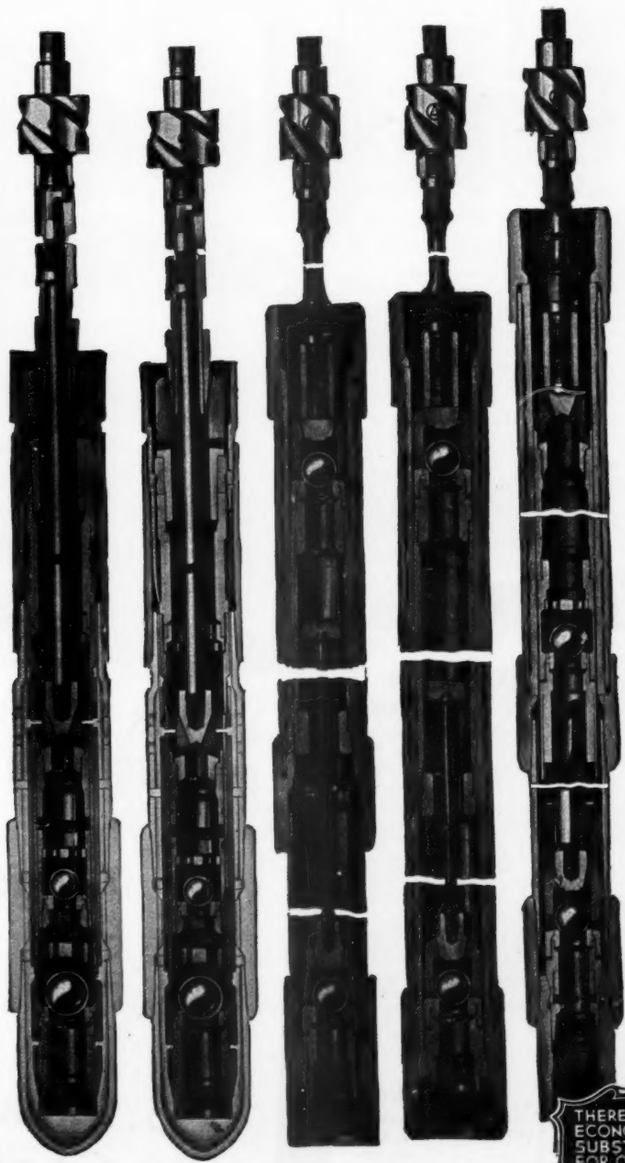
NORTHERN WEST TEXAS COMPLETIONS

(24-hr. rating based on last 3 hr. of 6-hr. gage)

Wildcat

Garza County: Ed McAdams 1 K. Stoker, elev. 2,378 ft.,

AXELSON OFFERS 12 TYPES OF PUMPS and HUNDREDS OF COMBINATIONS



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These drills are making friends everywhere!

MISSOURI
E. M. Gould & Son clean out a well after it had first been shot.

PENNSYLVANIA
Milo [illegible] Lilly uses a 24-L with [illegible] ft. derrick for cleaning out.

ILLINOIS
Harvey H. Sims uses his 36-L under a standard derrick.

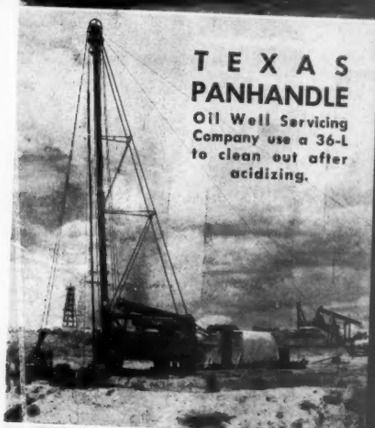
KENTUCKY
Newell & Kelly handle a 1500 ft. top-to-bottom job with a 24-L.

INDIANA
Nelson Brothers' rig on a job in the Hoosier state.

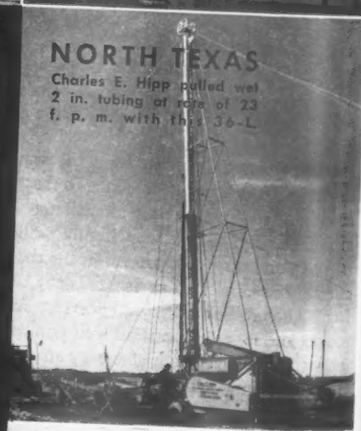
NEW YORK
C. P. Hubbard says he can move, set up and start all in 5 hours with this 24-L.

WEST VIRGINIA
Columbian Carbon Co. deepen a 5190 ft. well using their 36-L.

OHIO
Rutledge-Robinson & Mossholder bring in a new one with their 24-L.



TEXAS PANHANDLE
Oil Well Servicing Company use a 36-L to clean out after acidizing.



NORTH TEXAS
Charles E. Hipp pulled wet 2 in. tubing at rate of 23 f. p. m. with this 36-L.

OKLAHOMA
Magnolia Petroleum Company now have their 3rd Bucyrus-Erie rig — a 36-L.

MICHIGAN
Arenac Oil & Gas Co. drove 690 ft., 8 in. diameter in ten days with this 24-L.

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Fast moves . . . Quick set-up

Bucyrus-Erie
SOUTH MILWAUKEE, WISCONSIN

Sec. 942, Blk. 97, H.&T.C. Sur., dry at 3,398 ft.

Fields

Cedar Lake, Gaines County: Stanolind 8 American Warehouse, elev. 3,033 ft., 830 bbl., 530-qt. shot, 4,640-4,740 ft., T.D. 4,745 ft.

Dodge-Denman, Howard County: J. C. Ratliff 1 L. C. Denman, 383 bbl., plus 20 bbl. water, 590-qt. shot, 2,610-2,884 ft., T.D. 2,884 ft.

Emma, Andrews County: Montecito Corp. 1 Cowden, elev. 3,153 ft., 893 bbl., 1-in. choke, 4,165 ft., T.D. 4,266 ft.

Montecito Corp. 6 Cowden, elev. 3,138 ft., 1,389 bbl., 1-in. choke, 4,165 ft., T.D. 4,263 ft.

Seminole, Gaines County: Magnolia and Atlantic 2-193 H. & J., elev. 3,330 ft., 393 bbl., ½-in. choke, 5,145 ft., T.D. 5,230 ft.

Slaughter, Cochran County: Atlantic 28 Boyd, elev. 3,658 ft., 976 bbl., 10,000 gal. acid, 4,960 ft., T.D. 5,058 ft.

Magnolia 15 Woodley, elev. 3,679 ft., 983 bbl., 3-in. casing outlet, 9,000 gal. acid, 4,935 ft., T.D. 4,991 ft.

George P. Livermore 15 Boyd, elev. 3,667 ft., 1,101 bbl., 10,000 gal. acid, 5,025 ft., T.D. 5,080 ft.

Slaughter, Hockley County: Devonian Oil Co. 4 Mallett, elev. 3,630 ft., 1,474 bbl., 12,000 gal. acid, 4,999 ft., T.D. 5,060 ft.

Honolulu 23-B Slaughter, elev. 3,330 ft., 1,153 bbl., 2-in. casing outlet, 10,000 gal. acid, 4,915 ft., T.D. 4,999 ft.

Magnolia 14-J Mallett, elev. 3,618 ft., 1,393 bbl., 3-in. casing outlet, 10,500 gal. acid, 4,980 ft., T.D. 5,040 ft.

J. W. Murchinson 1 Gladys Peek, elev. 3,579 ft., 571 bbl., 5,000 gal. acid, 4,850 ft., T.D. 4,948 ft.

S. W. Richardson 22-B Slaughter, elev. 3,567 ft., 367 bbl., 5,000 gal. acid, 4,885 ft., T.D. 4,954 ft.

S. W. Richardson 23-B Slaughter, elev. 3,566 ft., 466 bbl., 10,000 gal. acid, 4,960 ft., T.D. 4,972 ft.

S. W. Richardson 24-B Slaughter, elev. 3,562 ft., 507 bbl., 7,000 gal. acid, 4,900 ft., T.D. 4,940 ft.

Stanolind 38-B Slaughter, elev. 3,534 ft., 856 bbl., 2-in. casing outlet, 9,000 gal. acid, 4,970 ft., T.D. 5,025 ft.

Texas 42 Slaughter, elev. 3,582 ft., 1,027 bbl., 12,000 gal. acid, 4,960-5,005 ft., T.D.

Texas 7-B Mallett, elev. 3,570 ft., 1,534 bbl., 13,000 gal. acid, 4,970 ft., T.D. 4,979 ft.

Texas 8-B Mallett, elev. 3,591 ft., 1,170 bbl., 12,000 gal. acid, 4,960 ft., T.D. 5,014 ft.

Texas 15-E Mallett, elev. 3,602 ft., 1,775 ft., 12,000 gal. acid, 4,945 ft., T.D. 5,028 ft.

Texas 34 Slaughter, elev, 3,560 ft., 1,192 bbl., 11,500 gal. acid, 4,960 ft., T.D. 5,005 ft.

Texas 40 Slaughter, elev. 3,581 ft., 1,562 bbl., 12,000 gal. acid, 5,920 ft., T.D. 5,003 ft.

Slaughter, Terry County: Gulf 10 Mallett, elev. 3,531 ft., 1,595 bbl., 10,000 gal. acid, 5,000 ft., T.D. 5,040 ft.

Wasson, Gaines County: Amon G. Carter 7-A Moore, 662 bbl., 1-in. choke, 12,000 gal. acid, 4,900 ft., T.D. 4,979 ft.

Wasson, Yoakum County: American Liberty 14 Keller, elev. 3,638 ft., 91 bbl., 1-in. choke, 10,000 gal. acid, 5,000 ft., T.D. 5,208 ft.

American Liberty 7 Knight, elev. 3,709 ft., 269 bbl., ¼-in. choke, 10,000 gal. acid, 4,960 ft., T.D. 5,309 ft.

Drilling & Exploration 2-C Hudson, elev. 3,640 ft., 397 bbl., ⅞-in. choke, 8,000 gal. acid, 4,890 ft., T.D. 5,100 ft.

Drilling & Exploration 6-C Hudson, elev. 3,645 ft., 340 bbl., ⅞-in. choke, 8,000 gal. acid, 4,920 ft., T.D. 5,100 ft.

Drilling & Exploration 1-B Randall, 138 bbl., ¼-in. choke, 11,000 gal. acid, 470-qt. shot, 4,962-5,092 ft., T.D. 5,100 ft.

Gulf 7 Elliott, elev. 3,626 ft., 723 bbl., 45/64-in. choke, 10,000 gal. acid, 5,140 ft., T.D. 5,200 ft.

Shell 1 M. L. Hammon, elev. 3,561 ft., 588 bbl., 10,000 gal. acid, top anhydrite 2,540 ft., top Yates 3,420 ft., top San Andres 4,700 ft., pay 5,235-5,351 ft., P.B. from 5,700 ft., T.D.

T. P. Coal & Oil Co. 33 Bennett, elev. 3,570 ft., 152 bbl., ⅛-in. choke, 9,000 gal. acid, 5,150-5,228 ft., T.D.

NORTHERN WEST TEXAS ACTIVE WILDCATS

Bailey County: Broderick & Calvert 1 G. H. Hayward, 4,167 ft. from W and 1,389 ft. from S lines of Lge. 73, Sutton C.S.L. Sur., 5,500-ft. test, drilled 250 ft., set surface casing.

Borden County: Anderson-Prichard 1 Johnson & Clayton, Sec. 1, Blk. 1, John DeShanzo Sur., 660 ft. from SW cor. Sec. 23, Blk. 10, E.L.&R.R. Sur., 4,000-ft. test, drilling 2,135 ft.

M. L. Richards 1 W. R. Dunn, SW NE Sec. 307, Blk. 97, H.&T.C. Sur., 3,200-ft. test, S.D., orders, 2,854 ft.

Briscoe County: Phillips 1 Montague, NE NE Sec. 6, Blk. B-4, A.B.&M. Sur., drilling at 3,300 ft.

Cochran County: O'Neal Drilling Co. 1 Wright, NE cor. Lab. 12, Lge. 60, Martin C.S.L. Sur., 3 mi. N of Dean area, fishing at 4,983 ft.

Crane County: Continental 1 E. B. Jones, 660 ft. from NE and NW lines Sec. 12, Blk. 3, H.&T.C. Sur., Ordovician test, top detrital zone 5,490 ft., Simpson 5,545-50 ft., Ellenburger 6,045 ft., bottom hole 6,135 ft.

Crosby County: George Callihan and C. L. Wager 1 E. M. Wahlenmaier, 460 ft. from N and E lines Sec. 3, Blk. D-15, Waxahachie Tap Sur., 3,200-ft. test, drilling 3,020 ft.

Dawson County: Ray Albaugh 1 Handley, SE SW Sec. 36, Blk. M, E.L. Sur., 5,250-ft. test, top Yates 3,050 ft., San Andres 4,580 ft., waiting on cement, T.D. 4,977 ft.

Gaines County: Likins & Hall 1 Jones, SW NW Sec. 13, Blk. A-7, P.S.L. Sur., 7,200-ft. test, drilling 4,065 ft.

(Continued on Page 188)

OKLAHOMA FIELD REPORT

Drilling Regulations Fixed For Chickasha Gas Field

By ROBERT INGRAM

WHILE attempts were still being made to control Little Nick 9 Glover, NE NE 27-5-8w, a wild gasser in the Chickasha field, the state Corporation Commission announced new drilling regulations for the field which the commission said were necessary to prevent blowouts, conserve bottom-hole pressure and prevent waste.

Among important requirements on future wells will be the installation of blowout preventers and testing of head fittings. Cementing also was required to prevent cratering. A string of surface pipe is to be set on each well at least 50 ft. below the last known fresh water sand and at a minimum depth of 500 ft., cemented from top to bottom.

The flow string is to be set at the bottom and perforated opposite the gas-producing formation, or set at the top of the formation and a liner run inside and cemented. The blowout preventer is to be installed as soon as surface casing is set. Proper mud on hand is required when approaching the producing formation, and while the use of tubing is optional, all untubed wells in producing horizons are to be equipped with two master gates, one of which may be removed if the other is holding.

Meantime, crews of M. M. Kinley, Houston, Tex., had succeeded in landing and cementing 2,100 ft. of casing in the wild well. Gas was still blowing through the casing since cement was run into the annular space. As soon as the cement hardened, a gate on the casing will be closed and the well will either be completed as a gasser or the flow will be killed.

The well blew out October 10, while drill pipe was in the hole and at a total depth of 3,802 ft. Drill pipe was cut off at around 2,100 ft., where the casing now is landed. While the source of the gas has not been determined, it is believed to open a new producing zone.

SUMMARY OF COMPLETIONS

	No.	Bbl.	Footage
Oil wells: Fields	14	2,751	38,193
Wildcats	1	200	3,064
Gas wells: Fields	5	*20.4	11,520
Dry holes: Fields	13	.....	32,375
Wildcats	6	.....	27,097
Total	39	.....	112,249
Recompletions: Oil	2	479	.....
Gas	1	*50	.....

*Million cu. ft.

New Gas Field Opened Near Laffoon Area

Big Chief Drilling Co. and associates have opened a Hunton lime zone gas field near the old Laffoon area in Lincoln County at 1 Barrett, W½ SW NE 20-13-6. The second Wilcox sand was dry at 4,425-49 ft., total depth. Plugged back and with pipe set at 4,283 ft., the Hunton zone was perforated and the well showed an estimated 10,000,000 cu. ft. of dry gas a day. Testing was delayed by bad weather. The Hunton was topped at 4,178 ft.

Second Deep Wilcox Well Showing at West Hotulke

In spite of continued mud and bad roads the Hotulke sector, between Tecumseh and Earlsboro, in Pottawatomie County, was setting a fast pace last week. Atlantic Refining Co., which discovered second Wilcox sand in the West Hotulke sector, had another well showing for that zone at 1 Nesbitt, SE NW NW of 27-9-4. On drill-stem test at 4,690-96 ft., total depth, there was 2,100 ft. of oil in the pipe; operators were to run casing.

Atlantic was taking drill-stem test at 3 Higbee, NW SE SW 22-9-4, after coring to 4,618 ft., in the second sand and getting saturation. This well is on south edge of the play.

New work is keeping ahead of completions in the general area, with the J. C. Crosbie, Inc., and Atlantic Refining starting 1 Hudson, NW NW NW 11-9-4, north of the play proper. Ohio Oil was moving in rig material for 1 Sandefur, NW NW NE 21-9-4. Atlantic was topping out derrick for 1 Galbreath, SW NE SW 23-9-4. R. Olsen Oil 1 Webb, C NE SW 24-9-4, set surface pipe with machine, but is delayed in getting tools moved in. Stanolind 2 Bowling, SE SW NW 25-9-4, set 191 ft. of surface pipe and was waiting.

Simpson-Fell has staked 2 Billington, C SE SE 24-9-4. Tide Water staked 2 Perry, NW NW 19-9-5, on east side of the play. Wood Oil Co. 1 Weber, NW NW NW 26-9-4, deepened to 4,541 ft. in second Wilcox sand, ran tubing and was testing.

Alma Oil 2 White, C NE NE 24-9-4, total depth 4,532 ft., plugged back and perforated at 4,260 to 4,345 ft. in Viola lime, to show mud with some oil, perforated at 4,108-44 ft. and at 4,077-96 ft., then acidized and tested 345 bbl. of oil in 24 hours through tubing, and later pinched to 135 bbl. in 21 hours through choke.

Guthrie Wildcat Twists Drill Stem, Has Fishing Job

Hard luck continues to dog Harry Miller 1 Katschor, wildcat in NE SW 7-16n-2w, on the edge of the Guthrie townsite. The test was forced to a fishing job when the drill stem twisted off in extremely hard formation at 5,904 ft. The formation is believed to be the Marshall zone and not the second Wilcox as previously thought. A sand encountered earlier in the week is now believed to have been another section of the first Wilcox formation.

Operators will drill ahead when the fishing job is completed, Miller said Wednesday, and will go at least to 6,000 ft. in the hope the wildcat will show some signs of production.

OKLAHOMA COMPLETIONS

Wildcats

Carter County: Sinclair Prairie 1 Ingram, NW NW NE 21-4s-3w, dry, T.D. 2,765 ft., Arbuckle 2,660 ft.

Logan County: Helmerich & Payne 1 Knox, SE SE SW 4-15-1, dry, T.D. 5,634 ft., second Wilcox 5,621 ft.

Magnolia 1 Patterson, NW SE NW 29-15-1w, dry, T.D. 6,113 ft., second Wilcox 6,077 ft.

Osage County: Devonian 1-A Osage, SW SW NE 34-22-7, pumped 200 bbl., sand 3,020 ft., 6-in. 2,772 ft., T.D. 3,064 ft., *discovery*.

Pottawatomie County: Jenkins 1 Lightner, NE NE NW 4-5-3, dry, T.D. 2,906 ft., Hogshooter 2,730 ft.

Seminole County: Barnsdall 1 Baker, NE SE NE 29-11-8, dry, T.D. 4,284 ft., Wilcox 4,267 ft.

Stephens County: Louis Sikes 1 Dibrell, SE SE SW 16-1-8w, dry, T.D. 5,500 ft.

Fields

Apache, Caddo County: Texas 4 Smith, NE NW NW 2-5-12w, flowed 912 bbl. through ⅜-in. choke, Bromide zone 3,611 ft., pay 3,639-3,763 ft., T.D. 3,763 ft.

Cement, Caddo County: Phillips 4 Fletcher, SW SE NW 34-6-10w, pumped 25 bbl., Noble-Olson 3,322-52 ft., 5½-in. 3,322 ft., T.D. 3,495 ft.

Rocket Drilling 2 Davis, SE NE NE 1-5-10w, flowed 140 bbl. by heads, pay 3,378-94 ft., 5½-in. 3,373 ft., T.D. 3,426 ft.

Centrahoma, Coal County: Ramsey 1 Replogle, NW NW NW 27-2-9, gaged 6,750,000 cu. ft. gas, pay 1,251-1,315 ft., 4½-in. 1,393 ft., T.D. 1,416 ft.

Comanche, Stephens County: Pace 2-A McMasters-B, SE SW NE 13-2s-8w, dry, T.D. 2,040 ft., 5-in. 1,973 ft.

East Cromwell, Okfuskee County: Titus 3 Replogle, SE SW NE 26-11-8, dry, T.D. 3,540 ft., Cromwell 3,529 ft.

Magnolia 1 Little, SE NE SW 11-10-8, dry, T.D. 3,579 ft., Cromwell 3,552 ft.

North Davenport, Lincoln County: Dunnett 2 Luckenbill, SE SE SE 29-15-5, flowed 100 bbl., pay 3,517 ft., Prue 3,508 ft., T.D. 3,543 ft.

South Earlsboro, Seminole County: Thompson Brothers 1-A Anderson, NE SW NE 22-9-5, flowed 224 bbl., Earlsboro 3,435-56 ft., T.D. 3,456 ft.

Empire, Stephens County: Don 3 Trout, NE NW SW 1-2s-8w, gaged 91,000 cu. ft. gas and lots of water, T.D. 2,232 ft.

McCasland 3 Burkleo, SW NE NW 4-2s-8w, dry, T.D. 2,802 ft.

West Holdenville, Hughes County: Mid-Continent 12 Factor, NW NW SE 15-7-8, dry, T.D. 4,512 ft., second Wilcox 4,507 ft.

Hotulke, Pottawatomie County: Alma 2 White, NE NE 24-9-4, 345 bbl., Hunton 4,077-4,144 ft., 5-in. 4,373 ft., T.D. 4,532 ft.

Isom Springs, Marshall County: Gill et al 1 Adams, SE NW NE 6-8s-6e, pumped 40 bbl., pay 532 ft., 6-in. 530 ft., T.D. 540 ft.

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Twelve Million-Foot Gasser Opens New Ohio Field

By STAFF CORRESPONDENT

NEWARK, Ohio, Oct. 27.—A wildcat test 7 miles east of Zanesville, Muskingum County, yielded a gas pay estimated at 12,000,000 cu. ft. The well, Ohio Fuel Gas Co. 1 John C. Winters, SW Section 5, Salt Creek Township, found the first streak of Clinton broken and dry. The top of the second Clinton streak was logged at 4,077 ft. with drilling stopped at 4,123 ft.

SUMMARY OF COMPLETIONS

Ohio

	No.	Bbl.	Footage
Oil wells	9	266	16,031
Gas wells	17	*31.1	48,169
Dry holes	12	.....	32,612
Total	38	.....	96,812

Indiana

	No.	Bbl.	Footage
Oil wells	5	344	9,816
Gas wells	2	*0.05	1,731
Dry holes	5	.....	7,000
Total	12	.....	18,547

Eastern Kentucky

	No.	Bbl.	Footage
Oil wells	5	60	3,625
Gas wells	3	*1.3	6,812
Total	8	.....	11,437
Recompletions	4	50	.....

Western Kentucky

	No.	Bbl.	Footage
Oil wells	5	255	6,015
Gas wells	1	*4.0	696
Dry holes	4	.....	2,732
Total	10	.....	9,443
Recompletions	1	200	.....
Pressure wells	1	.....	711

*Million cu. ft.

where gas blew the mercury out of a 10-in. gage in the 5-⅞-in. casing. The test is 10 miles northeast of the prolific Brush Creek gas pool.

A Portage County wildcat was plugged at 4,930 ft. after getting a small show of gas.

A test in Harrison County drilled through the Clinton to 5,820 ft. is a small gasser.

OHIO COMPLETIONS

Athens County

Canaan Township: D. T. Orndoff 3 A. P. Linscott, Sec. 16, 6,000,000 cu. ft. gas, Freeport sand 390-404 ft., R.P. 18 lb.

Lodi Township: Ross, Weimer & Ross 2 Wayne Wingett, at Pratts Fork, Sec. 13, 5 bbl. after shot, Mitchell sand, T.D. 398 ft.

Rome Township: Gibson et al 12 Wells Van Dyke, Sec. 30, 5 bbl., first Cow Run, shot, T.D. 439 ft.

Coshocton County

Perry Township: Mauller and Patten 1 Fred Ryan, Sec. 23, 300,000 cu. ft. gas, Clinton 3,007-33 ft.

Murphy Petroleum Co. 7 Wheeler Mossholder, NE Sec. 15, 45 bbl. after shot, Clinton sand, T.D. 3,117 ft.

Patton & Moore 1 Fred Rine et al, SW Sec. 24, 2,520,000 cu. ft. gas, Clinton sand, T.D. 3,035 ft.

Harrison County

Washington Township: East Ohio 2 W. L. Phillips, Sec. 32, 370,000 cu. ft. gas, shot, Clinton 5,664-87 ft., T.D. 5,820 ft.

Hocking County

Green Township: Griffin Producing Co. 1 Marlow Oil Co., SE Sec. 30, dry, Clinton sand, T.D. 2,909 ft.

Ward Township: Ohio Fuel 7008 Sunday Creek Coal Co., 586,000 cu. ft. gas, Berea, T.D. 1,013 ft.

Holmes County

Prairie Township: Ohio Oil Co. 1 F. H. Oates, Sec. 25, dry, Clinton 3,427-80 ft., Red Rock 3,507-15 ft., T.D. 3,689 ft.

Knox County

Howard Township: F. E. Perkins 2 Mary Blair, 30,000 cu. ft. gas, shot, Clinton, T.D. 2,705 ft.

Lawrence County

Windsor Township: Brammer Gas Co. 1 M. M. Brammer, Sec. 32, 31,000 cu. ft. gas, shot, Ohio shale, plugged, T.D. 2,680 ft.

Licking County

Eden Township: National Drlg. Co. 1 H. B. Oldaker, 125,000 cu. ft. gas, shot, Clinton 2,686-2,714 ft., T.D. 2,729 ft.

Hopewell Township: Fred W. Abbott et al 1 Caldwell & Currie No. 3 farm, SE Sec. 24, 50 bbl., Clinton sand, T.D. 3,048 ft.

Madison Township: Allen Willey et al 1 C. A. Darkes, second quarter, 1,250,000 cu. ft. gas, shot, Clinton 2,531-67 ft., T.D. 2,573 ft.

C. A. Davis et al 1 Charles Sawyer, second quarter, 500,000 cu. ft. gas, Clinton 2,503-28 ft., T.D. 2,547 ft.

Rutledge and Mossholder 1 R. L. Wooles, second quarter, dry, Clinton 2,448-83 ft., T.D. 2,500 ft.

Lorain County

Penfield Township: H. C. Bishop 1 S. Brouse, Sec. 2, dry, Clinton, T.D. 2,530 ft.

Medina County

Hinckley Township: Ohio Fuel 1 Lad Divoky, Lot 52, 600,000 cu. ft. gas, shot, Clinton, T.D. 3,621 ft.

Meigs County

Orange Township: Ohio Fuel 1 Mary Carr, Sec. 36, 2,900,000 cu. ft. gas, Berea, T.D. 1,584 ft.

Rutland Township: Ohio Fuel 4 Lee Nelson, Sec. 22, dry, Maxon, T.D. 957 ft.

Monroe County

Bethel Township: Graham Oil 7 P. Adams, Sec. 30, 5 bbl., shot, Injun, T.D. 1,500 ft.

Morgan County

Marion Township: Williams Bros. 1 N. M. Wood, Sec. 33, 150,000 cu. ft. gas, second Cow Run, T.D. 580 ft.

York Township: Ohio Fuel 2 H. B. Snyder, Sec. 22, 2,100,000 cu. ft. gas, Clinton 4,053-90 ft., T.D. 4,091 ft.

Litton & Radford 1 Frank Matheny heirs, Sec. 23, 500,000 cu. ft. gas, Clinton 4,205-54 ft., T.D. 4,307 ft.

Muskingum County

Muskingum Township: Industrial Gas Co. 1 W. C. Miller, Sec. 15, Clinton, T.D. 3,342 ft.

Noble County

Center Township: Warren & Dutton 1 Charles Laughlin, Sec. 12, dry, Berea, T.D. 1,750 ft.

Elk Township: B. C. Robinson et al 13 Anna Carmel Walker, SW Sec. 22, 3-bbl. pumper, Germantown sand, T.D. 1,040 ft.

Olive Township: John Asler 1 C. C. Marquis, Sec. 5, 1 bbl., shot, Berea, T.D. 1,687 ft.

Perry County

Clayton Township: Preston Oil 3 Margaret A. Shaw, Sec. 8, 150 bbl., shot, Clinton 3,154-94 ft., T.D. 3,206 ft.

Pleasant Township: Preston Oil 205 Sunday Creek Coal Co., Sec. 4, dry, Berea, T.D. 1,039 ft.

Portage County

Deerfield Township: Magnolia Petroleum Co. 1 H. A. Forney, Lot 55, 50,000 cu. ft. gas, blew down to 15,000 cu. ft., plugged, Clinton 4,720-4,850 ft., Red Rock 4,895-4,930 ft.

Stark County

Plain Township: Lyons et al 2 Chris Graber, Sec. 22, 800,000 cu. ft. gas, shot, Clinton, T.D. 4,600 ft.

Washington County

Barlow Township: Baker et al 1 Dale Johnson, Sec. 10, 280,000 cu. ft. gas, Squaw, T.D. 1,450 ft.

Grandview Township: McCall Drlg. Co. 7 James Ewers, Sec. 21, 5 bbl., shot, Keener, T.D. 1,602 ft.

Wayne County

Plain Township: Ohio Fuel 1 Guy Shaffer, Sec. 36, 20,000 cu. ft. gas, Clinton, plugged, T.D. 3,112 ft.

Kemrow Co. 1 J. A. Musser, Sec. 28, 35,000 cu. ft. gas, shot, Clinton, plugged, T.D. 3,174 ft.

Posey County Discovery Shows for 75-Bbl. Well

EVANSVILLE, Ind., Oct. 27.—Haynes, Thomas & Sloan's pool-opening well in Posey County, 1 Scherer, NE NE NW 13-7s-13w, 3½ miles east of Mount Vernon, has been put on pump for a production test. It is showing for about a 75-bbl. well following an 8-qt. shot in the Aux Vases sand at 1,937-49 ft. No. 1 Scherer is 3½ miles south of production in the county's Caborn field.

Another Posey County wildcat and prospective pool opener, Carter 1 Maier, N½ NE SW 1-7s-14w, encountered saturation in the Waltersburg sand at 1,965-2,015 ft., apparently capable of commercial production. Best Waltersburg pay was at 1,965-92 ft. The well flowed on a drill-stem test after 45 minutes. The remainder of the sand from 1,992-2,015 was broken by intervals of shale. The Waltersburg, however, was passed up as operators drilled on to explore deeper horizons. On a drill-stem test of Tar Springs sand at 2,065-78 ft., 175 ft. of salt water and 15 ft. of oil-cut mud were recovered. Drilling and coring is being continued with the St. Louis lime as the goal.

INDIANA COMPLETIONS

Wildcats

Harrison County: Harrison Dev. Corp. 1 Echart, NW NW NW SE 7-4s-4e, 25,000 cu. ft. gas, pay 807-18 ft., Albany 800 ft., T.D. 818 ft.

Posey County: Robert Burns 1 Mumford Realty, SW NW NE 5-4s-13w, rig abandoned.

Sullivan County: T. H. Drake 1 Curry, NE NW 11-9n-8w, dry at 2,004 ft., Devonian 1,929 ft.

White County: National Pet. et al 1 J. G. Brown, NW NE NW 16-28n-4w, dry at 990 ft., Trenton 890 ft.

Fields

Cannelburg, Daviess County: J. W. Cannon 10 Evans, NW SE NE 8-2n-5w, dry at 641 ft.

Colbertson County: A. W. Modert 1 Hughes, N½ NE NW SW 10-21n-8e, dry at 1,025 ft.

Griffin, Gibson County: Briaus & Wheelock 3 Kleiderer, S½ SE SW SE 28-3s-14w, pumped 45 bbl., 63-qt. shot 2,160-76 ft., T.D. 2,176 ft.

Briaus & Wheelock 4 Kleiderer, SE SW SE 28-3s-14w, pumped 125 bbl., 90-qt. shot 2,785-2,800 ft., T.D. 2,800 ft.

Briaus & Wheelock 5 Kleiderer, SE SW SE 28-3s-14w, flowed 133 bbl., 100-qt. shot 2,775-98 ft., T.D. 2,798 ft.

Mount Carmel, Gibson County: Princeton Mining 2 Smith, NE NE SE 21-1s-12w, dry at 2,340 ft., Glen Dean 1,768 ft., Golconda 1,852 ft., Barlow 1,954 ft., Ste. Genevieve 2,254 ft.

Rockport, Spencer County: Texas 2 Scamahorn, NW SE NW 29-7s-6w, flowed 16 bbl., natural, pay 929-37 ft., T.D. 937 ft.

Trenton, Madison County: Arthur Laws 1 McAllister, W½ W½ SE SW 25-18n-7e, 25,000 cu. ft. gas, 20-qt. shot 909-13 ft., Trenton 905 ft., T.D. 913 ft.

Miscellaneous, Gibson County: Woodruff et al 1-A Hall, SW NW SW 31-2s-12w, pumped 25 bbl. oil and 12 bbl. water, 10-qt. shot 1,096-1,105 ft., T.D. 1,105 ft.

EASTERN KENTUCKY

ASHLAND, Ky., Oct. 27.—Eastern Kentucky's oil production has been increased this week according to reports received from various points. A daily production of better than 60 bbl. of oil seems assured and at the same time three gas wells have been reported completed in this area. The same strong trend of drilling activities was stressed with several new locations reported and current operations continuing unabated.

A report from a usually reliable source says that T. J. Gilbert has completed a well on the Bennie Wells farm in Menifee County with an estimated production of 25 to 50 bbl. of oil per day. Exact data and total depth are not available here.

Powell County

Agatha Wireman 26 J. M. Townsend, South Fork, 10 bbl. at 680 ft.

South Co. 16 W. M. Adams, South Fork, 3 bbl. at 647 ft.

Less Amatheral et al 3 Elmo Rodgers, Miller's Creek, 10 bbl. at 800 ft.

M. C. Eldowany and Barnes et al 7 Matson, Miller's Creek, 2 bbl. at 700 ft.

Four old wells on the Perry Hall land in Powell County were cleaned out, acidized, and are now making about 50 bbl. of oil per day, combined production.

Floyd County

Kentucky-West Virginia 650 Harvey Clark, Buffalo Creek, 762,000 cu. ft. gas, Big lime at 1,520, R.P. 460 lb.

Kentucky-West Virginia 5330 Richard Hall, Right Beaver Creek, 381,000 cu. ft. gas, shale, R.P. 274 lb., at 2,570 ft.

Knott County

Inland Gas Corp. 227 W. R. Smith, Left Fork of Troublesome Creek, 133,000 cu. ft. gas at 2,722 ft.

WESTERN KENTUCKY

Breckinridge County, Victoria School district: W. J. Flesher 3 C. W. Moorman, dry, T.D. 312 ft.

Daviess County, Utica district: Creek Drilling Co. 13 Gus Morgan, 95 bbl., shot. Jones sand 1,20[illegible] ft., 10-qt. shot, Bethel sand 1,432-38 ft., shot, Bethel sand 1,438-43½ ft., T.D. 1,456½ ft.

Petroleum Co. 4 Ed Howard 125 bbl., acidized, McClosky 1,722-27 ft., T.D. 1,733 ft.

Redwing & Shaffer 1 S. A. Burns, dry at 900 ft.

Pleasant Ridge district: Daugherty 8 W. A. Hewlett, pressure well in stray sand, T.D. 711 ft.

Hancock County, Pellville district: Leeper Oil Co. 7 G. L. Rowland, 10 bbl., shot, Jett sand 477-94 ft., T.D. 504 ft.

(Continued on Page 191)

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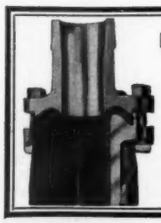

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North Hiawatha Wildcat Is Checking High on Wasatch

By T. R. INGRAM

DENVER, Colo., Oct. 27.—A. B. Cobb 1 Jeffries-Stufft, CEL SE NE 3-35n-6w, at the north end of the Cut Bank field and an outside well on the west side, attracted attention when it swabbed 150 bbl. first 24 hours from the Sunburst sand at 2,896-2,904 ft. An attempt is being made to carry it on down to the Cut Bank sand with a spudder after moving off the rotary. The location is in a spotted area where almost anything can be expected. It is a northwest offset to Cobb-Texas 1 Mueller, completed last month for 473 bbl. The latter, however, produced principally from the Cut Bank sand at 2,968-3,007 ft. There was no break between the Sunburst and the Cut Bank, and the production string was set in the Sunburst at 2,958 ft., 33 ft. below the top. The Jeffries-Stufft well also is a mile to the southwest of Glacier Production 2 Rigney, which was completed early in 1940 for 80,000,000 cu. ft. in the Moulton-Sunburst sands. Santa Rita 14 Tribal, nearly a mile to the southeast, was dry in the Sunburst, but an average producer in the Cut Bank sand.

North Hiawatha Wildcat Running High

The Vermilion Oil Co. 1 Government, a wildcat on the North Hiawatha structure, is reaching an interesting stage and the past week cut a sand in the Wasatch at 2,138-50 ft. which had oil in the top followed by water. The water was shut off with the 10¾-in., which is being carried, and it is drilling ahead. It is located 2 miles north and northeast of the same company's No. 1 Horrocks, completed in January, this year, at 3,540 ft. for 12,000,000 cu. ft. Last named is supposed to be on the north flank of the East Hiawatha dome with a separate closure from the structure upon which the drilling well is located. The logs of the two wells are correlating fairly well and indicate that the wildcat to the north is running about 50 ft. higher. No. 1 Government showed for 1,500,000 cu. ft. of gas in a 10-ft. sand at 450 ft., the shallowest depth in which gas has been found in the area. It also had 3,000,000 cu. ft. at 1,530 ft.

Fulcher Basin Test Finds Oil In Farmington Formation

Carroll & Cornell 5 Cornell-Government, in Fulcher basin, northwest New Mexico, drilling to the Picture Cliff gas sand at around 2,000 ft., encountered a 40-ft. saturated sand in the Farmington formation at 940-80 ft. which gives indications of making a commercial well. The 8-in. was run to 750 ft. to shut off water, and below that point the hole is open. It was pumped for 6½ hours in that condition and made 52 bbl. of 58-gravity crude, but on account of the open hole no 24-hour test could be made. It will be given a thorough test before resuming to go to the original objective. The Fulcher Basin field was a discovery a year ago. It lies between the Aztec and Kutz Canyon gas fields.

COLORADO DRILLING REPORT

Archuleta County: Navajo Oil Co. 1 Brooks, NE NE NW 2-32n-2e, spudded in 12½-in. hole, cable tools, to go to Dakota at around 1,100 ft., S.D. to complete rigging.

Cheyenne County: Elmer E. Whitson et al 1 Christian, C NW SE 12-13s-49w, derrick.

Huerfano County: Rhevm & Tomkins 1 Two Pines, SE SE 31-28s-69w, drilling 1,206 ft.

S. W. Pressey 3 Alamo, SW SW NW 10-27s-68w, drilling 1,204 ft.

Kiowa County: Stanolind 1 Snell, C SW SW 7-20s-41w, moving in.

La Plata County: Nick Spatter 1-X Bryce, C SW SW 31-33n-9w, resumed at 4,450 ft., cleaning out.

E. B. Klem 1 Olbert, NW SW 9-35n-12w, T.D. 4,290 ft., fishing tools.

Las Animas County: Barney Oil 1 Dutto-Marchisio, NW NW 32-33s-62w, drilling 1,543 ft.

Logan County: Mutual Oil 1 State, C SW SW 32-7n-51w, T.D. 4,840 ft., shot off casing, to test sand above Muddy.

Moffat County: Texas 13 Knowlton, NW NW NW 10-4n-91w, drilling 4,458 ft.

Privett & Spangler 1 Stillings, NE SE SE 12-5n-96w, drilling 1,695 ft. in shale.

Great Divide Petroleum 1 Wyatt, NW NW SE 6-9n-92w, S.D. 1,700 ft. for orders.

C. R. Privett 1 Sutton, NE NE SW 1-5n-96w, T.D. 2,420 ft., straightening hole at 2,346 ft.

Mountain Fuel Supply 9 Florence Wilson, NE SE NE 22-12n-100w, drilling 2,417 ft.

SUMMARY OF COMPLETIONS

Wyoming

	No.	Bbl.	Footage
Oil wells: Fields	2	180	7,312
Dry holes: Fields	1	.....	1,365
Total	3	.....	8,677

Montana

	No.	Bbl.	Footage
Oil wells: Fields	3	287	6,411
Gas wells: Fields	4	*7.3	4,452
Dry holes: Fields	1	.....	956
Total	8	.....	11,819

*Million cu. ft.

Stanolind 19-M Parkinson, NW SW NE 22-4n-92, drilling 3,525 ft.

Stanolind 11-X Parkinson, CWL NE SE 22-4n-92w, building rig.

Rio Blanco County: Texas-California 8 Unit, NW SE NW 26-3n-9w, rigging up rotary.

United Oil Producers 1 Hill, Lot 13, 6-1n-101w, S.D. 1,300 ft.

Desert Oil Co. 1 Rector, Lot 6, 35-2n-102w, location, first report, Rangely field.

United Producers 2 Hill, CEL Lot 13, 6-1n-101w, spudded.

Routt County: Elk River Co. 1 Fred N. May, C SE SE 34-8n-86w, spudded with cable tools, to go to Sundance at 2,600 ft.

WYOMING COMPLETIONS

Lance Creek field, Niobrara County: Continental 14 Otto Rohiff, NW NW SW 32-36n-65w, T.D. 5,182 ft., 7-in. 5,155 ft., 170 bbl. in 24 hr. from Leo sand after acidizing with total of 3,000 gal.

Osage field, Weston County: Carl Kundy 3 NE NE NW 32-46n-63w, dry at 1,365 ft., T.D.

Updike Brothers 2, NW SW NE 35-46n-64w, pumped 10 bbl. a day from sand at 2,124-30 ft. after a shot.

WYOMING DRILLING REPORT

Carbon County: Continental Oil 1 Frank M. Johnson, SE SE SW 1-24n-88w, drilling 2,170 ft., top second Wall Creek 1,772 ft., third Wall Creek 1,825 ft.

Sinclair-Wyoming 27-A Wertz, CSL NW SW 6-26n-89w, drilling 2,210 ft.

Ohio Oil 1 Union Pacific, NE NE 33-20n-81w, drilling 3,225 ft.

Sinclair-Wyoming 26-A Wertz, NW SE SE 1-26n-90w, (Sweetwater County), drilling 3,110 ft.

Sinclair-Wyoming 1 Mary Carter, NE SE SE 31-25n-88w, cemented 16-in. 415 ft.

Sinclair-Wyoming 5-F Mahoney, C NE NW 34-26n-88w, T.D. 4,348 ft., top Tensleep 4,346 ft., running 7-in.

Glen Swartout 3 Union Pacific, NE NE SE 21-22n-78w, drilling 915 ft., carrying 8-in.

Sinclair-Wyoming 25-A Wertz, NW SE SW 6-26n-89w, drilling 4,508 ft., top Dakota 3,765 ft.

Sinclair-Wyoming 25-C East Ferris, SE SE NW 25-26n-87w, S.D. 3,990 ft. for orders, top Chugwater red beds 2,470 ft.

Fremont County: Continental Oil 3 Shoshone, CEL SE NE 1-6n-3w, drilling 565 ft. in saturated sand, top Tensleep 395 ft.

Kirk Oil 6 Tribal, CNL NW SW 23-6n-2w, drilling 750 ft., 8¼-in. 437 ft.

Indian Oil 4 Tribal, SW NW NW 23-6n-2w, moving in.

Lincoln County: H. C. Harris 1 Government, SE NW NW 23-21n-117w, drilling 3,505 ft. in brown sand topped at 3,480 ft.

Natrona County: Casper Creek Oil 1 State, SW SW NW 36-36n-81w, T.D. 2,640 ft., lowering 5-in. for water shutoff.

Iba Dev. Co. 1, C NE SE 25-32n-82w, drilling 1,725 ft.

General Petroleum 75-17-G, NW NE SE 17-35n-77w, T.D. 4,609 ft., top Shannon 4,640 ft. (formerly No. 17-35-G).

General Petroleum 57-16-S, NW SW NE 16-35n-77w, spudded.

K. S. Albert 1 Young, NE SE 25-32n-82w, T.D. 1,630 ft., cemented 5-in. 1,590 ft., show oil.

Niobrara County: Lewis Gokel 2, CEL SW SE 2-34n-63w, drilling 510 ft.

J. L. Berggren 1 fee, SE NW 23-35n-63w, drilling 2,761 ft., Bell sand 2,749-57 ft., 2 bailers water per hr.

Cow Gulch Oil 1 Nelson, C SE SW 19-35n-65w, drilling 1,250 ft., cemented 13-in. 300 ft.

Park County: Yale Petroleum 2-B Frisby, NE NE SE 32-52n-100w, T.D. 3,384 ft., top Embar 3,368 ft., swabbing rate 500 bbl. per day.

Husky Refining 4-A Rosseau, NW SE SW 33-51n-100w, drilling 2,240 ft.

Stanolind 11-X Rosenberg, SE NE NE 26-58n-98w, T.D. 3,146 ft., top Embar 2,997 ft., Tensleep 3,050 ft., swabbed 6 bbl. per hr., installing pump.

MacKinnie Oil & Drilling 1 Northern Pacific, CNL NW NW 5-57n-99w, drilling 2,350 ft. in Mowry shale.

Enalpac O. & G. 3 Purple, NW SW SE 32-51n-100w, T.D. 3,617 ft., cemented 5½-in. 3,571 ft., top Embar 3,258 ft., Tensleep 3,554 ft., perf. 210 holes at 3,296-3,508 ft., pumping rate 220 bbl. per day.

Enalpac O. & G. 1 Custer, NE NE SW 32-52n-100w, drilling 1,523 ft.

Yale Petroleum 2-A Mattie, SW SW NW 33-51n-100w, location.

Yale Petroleum 3-A Frisby, NE SW NE 32-52n-100w, location.

Continental 2 Northern Pacific-2, NW SW NE 23-58n-98w, rigging up rotary, first report, Frannie field.

Sublette County: Texas 2-I Government, SE NW SW 27-27n-113w, T.D. 652 ft., fishing.

Sweetwater County: Sinclair-Wyoming 8 Hughes, SW SW SW 2-26n-90w, drilling 2,793 ft., top Sundance 2,345 ft.

Farson O. & G. 1 Government, C SE NE 18-25n-108w, drilling 1,750 ft.

Vermilion Oil 1 Government, SW NE NE 6-12n-99w, drilling below 2,150 ft., sand 2,138 ft., show oil followed by water (see lead).

Weston County: John Brorphy 1 Hansen, NW NE NW 13-44n-63w, drilling 3,200 ft. below Muddy sand.

Hultgren & Thompson 1 Sewell, C SW NW 3-46n-63w, T.D. 312 ft., showing for small well, testing.

Wesco Oil 6, NE NE SE 20-46n-63w, cemented 8¼-in. through Greenhorn.

Federal Oil 11, NW SE SE 15-46n-64w, spudding, first report.

MONTANA COMPLETIONS

Bowdoin field, Phillips and Valley counties: Montana-Dakota Utilities 643 Bell, C NE SW 32-32n-34e, T.D. 880 ft., 5½-in. 746 ft., 143 ft. 4½-in. liner on bottom, 310,000 cu. ft., R.P. 185 lb.

Montana-Dakota Utilities 642 First National Bank, C NW SE 7-32n-34e, T.D. 932 ft., Bowdoin sand 697-755 ft., Phillips sand 850-932 ft., 5½-in. 691 ft., 458,000 cu. ft., R.P. 254 lb.

Bowes field, Blaine County: Montana Gas Corp. 1 Dineen, C NW NW 2-31n-19e, Eagle sand dry at 805-956 ft.

Box Elder field, Hill County: Independent Natural Gas 1009 Kinipel, NW NE SE 15-32n-17e, T.D. 1,286 ft., top Eagle sand 1,278 ft., 5½-in. 1,277 ft., 5,450,000 cu. ft. gas.

Cut Bank field, Glacier County: Ralph E. Davis 2 Tribal-205, SE SE NE 25-32n-6w, T.D. 3,021 ft., 7-in. 2,982 ft., show oil in Sunburst 2,950-62 ft., Cut Bank 2,980-3,018 ft., 2,000 ft. fluid, main pay 3,005-18 ft., swabbed 195 bbl. first 24 hr.

Kevin-Sunburst field, Toole County: Pfabe & Engelking 1 Danielson, CNL SE NE 20-35n-1w, contact 1,551-60 ft., 12 bbl. oil, no water after acid, will acidize again.

J. H. Agen 1 fee, C NW SE 16-35n-3w, T.D. 1,830 ft., contact 1,819 ft., acidized, 10-day average 80 bbl. per day, no water.

Hannah-Porter 1 State, SW NE NW 13-33n-2w, T.D. 1,354 ft., Sunburst 1,195-1,226 ft., est. 1,000,000 cu. ft.

MONTANA DRILLING REPORT

Carbon County: R. C. Tarrant 2 McKay, C SE NW 4-6s-18e, resumed at 3,057 ft., drilling 3,680 ft. in Chugwater.

Fallon County: Carter 1 Northern Pacific, C SE SW 19-4n-62e, T.D. 9,678 ft. in Cambrian, taking electrical log.

Mondakota Dev. Co. 3, C NE NE 36-5n-60e, drilling 500 ft. in Pierre shale.

Glacier County: Santa Rita 4 Jordan, C NE SE 7-32n-5w, drilling 1,470 ft., top Colorado 510 ft., 10¾-in. 546 ft.

Santa Rita 1 State, SW NE SE 25-33n-6w, cemented 10¾-in. 535 ft., top Colorado 520 ft.

Glacier Prod. 4 Corrigeux, CWL NW 21-33n-5w, cemented 10¾-in. 630 ft., top Colorado 605 ft.

Texas 10 Morrison, C S½ NW 22-35n-6w, drilling 170 ft.

A. B. Cobb 1 Jeffries-Stufft, CEL SE NE 3-35n-6w, swabbed 150 bbl. first 24 hr. from Sunburst at 2,896-2,904 ft., trying to drill ahead.

Wm. Hanlon 2 Tribal-196, SE NE NE 30-32n-5w, rig.

Wilkinson & Potter 3 Tribal-126, C N½ NW 7-32n-5w, ready to spud.

A. P. Consolidated 6 Keisel, CNL NW 11-34n-6w, drilling 975 ft., top Colorado 520 ft., 10¾-in. 520 ft.

Glacier Prod. 4 Rigney, SW SW NW 2-35n-6w, cemented 10¾-in. 452 ft.

Par Oil 1 Tribal-200, SE SW SE 13-32n-6w, T.D. 3,045 ft., 1,000 ft. fluid 3,028-45 ft., underreaming 7-in. at 3,010 ft.

R. C. Tarrant 3 Larson, C E½ NW 7-34n-5w, running 7-in. at 2,695 ft.

McDonald, Henderson, Overcash 3 Tribal-190, SW NE NW 29-32n-5w, rigging, first report.

Par Oil 2 Tribal-204, NE NW SE 13-32n-6w, rig, first report.

Wm. Hanlon 3 Tribal-196, SW NW NE 30-32n-5w, rig, first report.

Indian Oil 2 fee, C NW SW 4-34n-6w, location, first report.

Texas 4 Bonnet, CNL SW SW 8-32n-5w, rigging up, first report.

(Continued on Page 191)

Banking, Too, Has Changed

WHILE vast improvements have been made in drilling and production methods in the petroleum industry during the past quarter-century, banking, too, has changed. But throughout this period this bank has been "The Oil Bank of America."

NATIONAL BANK OF TULSA

The Oil Bank of America

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Sweden Field Outpost May Open Important New Sand

By F. L. SINGLETON

CORPUS CHRISTI, Tex., Oct. 27.—Probable discovery of several new producing areas, and extensions to proven fields, marked up an interesting week of developments in the Southwest Texas district the past week. Field development was being maintained at a steady rate, while locations for several interesting wildcats were announced.

In the Corpus Christi area, Fred W. Shields 1 J. M. Clemmons, a wildcat located 3 miles northwest of the town of Mathis, San Patricio County, looms as the discovery well of a new field following three drill-stem tests which showed possible production. Sand with an oil odor was cored at 4,133-34 ft., and from 4,207-09 ft., and a 4-minute drill-stem test at 4,206-17 ft. tested 30 ft. of oily mud. A second test at 4,202-17 ft. tested 325 lb. working pressure and 150 ft. of salt water with a good show of oil, while an 11-minute test at 4,687-95 ft. tested 495 lb. working pressure and 3 gal. of distillate. The well is located in the I.&G.N. Survey, Abstract 174, several miles west of the East Mathis field. The sand section from which the showings were logged are believed to be members of the Greta sand series.

SUMMARY OF COMPLETIONS

Lower Gulf Coast

	No.	Bbl.	Footage
Oil wells: Fields	13	1,610	78,129
Gas wells: Fields	1	.....	3,821
Dry holes: Fields	3	.....	16,734
Wildcats	2	.....	9,625
Total	19	.....	108,309

South Texas

	No.	Bbl.	Footage
Oil wells: Fields	5	389	14,527
Dry holes: Fields	2	.....	5,610
Wildcats	4	.....	9,615
Total	11	.....	29,752

South Central Texas

	No.	Bbl.	Footage
Oil wells: Fields	3	152	5,254
Dry holes: Wildcats	2	.....	4,511
Total	5	.....	9,765

Trying for New Sand at Petronilla

Offsetting the discovery well of the new Petronilla field, Nueces County, Coquat, Buescher & Eaton 1 J. R. Knight is attempting to complete in a new sand after the discovery sand was found to carry salt water. An electrical survey showed the new sand from 6,940-90 ft., the oil water contact at 6,970 ft., and the discovery pay at 7,333-65 ft., was logged about 26 ft. low. A drill-stem test in the 6,900-ft. sand recovered oil and a second producer is assured.

New Wildcat Locations

Nueces County gained an interesting wildcat location as Renwar Oil Corp. moved in material for 1 S. C. Cooper, a projected 7,500-ft. well located 3 miles northwest of Bishop in the Palo Alto grant. One mile east of the St. Charles field, Aransas County, Continental spudded 4 St. Charles Co., located in the Aransas County School Land Survey

In Jim Wells County, and located south of the Camada field, Gus Tsemelis 1 P. S. Joseph, located in Section 9 of the Plummers subdivision, Jose Maria Garcia grant, is being prepared for a production test. Total depth of the hole is 6,012 ft., and casing is being cemented to test showings of oil and gas logged in the Frio-Vicksburg formation at intervals from 4,800-5,700 ft.

New Sand Found in Sweden Outpost

A new sand found in a southwest outpost well to the Sweden field, Duval County, may convert the field into an important producing area. The strike was made by Hiawatha Oil & Gas Co. 6 Herberger which is being prepared for a production test after pipe-line oil was recovered on a drill-stem test. Clean sand showing oil and gas was cored at 4,930-36 ft., shale from 4,936-40 ft., and a 15-minute drill-stem test at 4,930-40 ft., through ¼-in. choke top and bottom, tested 135 lb. working pressure and 1,200 ft. of oil was recovered. Five and one-half inch casing was cemented on bottom and the well was scheduled to be tested at the close of the week. Sweden was one of the first Cockfield sand fields to be found which resulted in a trend play through the eastern half of Duval County. The discovery well was drilled in 1937 and was completed at 5,846-56 ft. for a gas-distillate producer. Later development proved up several sands in the Jackson series, but the sands were lenticular and development has been more or less disappointing. At a recent date only four wells were on production having a daily initial production of 64 bbl. daily.

The Pettus sand trend of Duval County gained another interesting wildcat location as Humble Oil & Refining Co. prepared to drill 2-E J. F. Welder located about 14 miles northwest of San Diego. The well is situated in the E. N. Gray Survey, Section 224, about 1,630 ft. southeast of the company's 1-E Welder, abandoned during the week at a total depth of 4,513 ft. The latter well logged some interesting showings, but drill-stem testing was unsuccessful.

Extension Indicated at Sejita

An extension to the Sejita gas-distillate field, Duval County, was indicated as Trinity Gas Corp. 1 Yzaguirre, R. Ramirez Survey, prepared to cement casing after logging gas sand at 5,243-60 ft., and at 5,378-92 ft. Total depth of the hole is 5,501 ft. The well is about 1 mile east of the company's 1 Casey.

La Reforma Oil Discovery Ready to Test

In the La Reforma gas field, Starr County, J. L. Collins 3 Guerra which showed promise of opening the first crude production from the structure the previous week, is being prepared for a production test. Total depth of the hole is 6,200 ft. and 5½-in. casing was cemented on bottom preparatory to testing at 6,140-53 ft. while a drill-stem test recovered pipe-line oil. Sand with an oil odor was also cored at intervals from 6,153-6,168 ft., but drill-stem testings showed mud with an oil odor and some salt water. The well is located several hundred feet west of a 7,000-ft. dry hole, and about 4,000 ft. northeast of Magnolia 1 Guerra, a gas well.

In the southern part of the county, about 4,100 ft. northwest of the discovery well of new Chapotal field, Sun Oil Co. is preparing to test 1 Chapotal Land Co. Total depth of the hole is 4,236 ft. in oil sand and 5½-in. casing was cemented at 4,235 ft. The discovery well was completed 2 weeks ago as a small producer in the Frio-Vicksburg at 4,232-33 ft.

In the Carolina-Texas gas field, Transwestern Oil Co. and Carter-Rubsamen Drilling Co. are reported to have made a deal with the Continental Oil Co. for the deepening of 13 Houston Oil Co. from 5,500 ft. to 9,000 ft. or approximately 500 ft. into the Wilcox.

Dimmit County Wildcat Blows Out

In the Balcones fault-line district, Wellington Oil Co. 1-B D. J. Sullivan, a wildcat located about 10 miles northwest of Carrizo Springs, Dimmit County, blew out while drilling in sand from 1,086-90 ft., the total depth. The well was brought under control and a pressure gage, placed on the kelly showed 350 lb. pressure. The company will continue to circulate and after the well is thoroughly killed, a drill-stem test will be attempted. The sand section is reported to be one of the Navarro sands and is believed to be slightly higher than the upper gas sand found in the Carrizo field at approximately 1,700 ft.

SOUTHWEST TEXAS COMPLETIONS

LOWER GULF COAST

Wildcats

Bee County: Fred Shield 1 M. M. McKinney, dry, T.D. 4,515 ft.

Jim Wells County: H. J. Porter 1 Haverlah, dry, T.D. 5,110 ft.

Fields

Agua Dulce, Nueces County: Graham 1 W. H. Wallace, 75 bbl., open flow, perf. casing 6,890-6,932 ft., T.D. 6,980 ft.

Agua Dulce, Kleberg County: Humble 1 King, 168 bbl., 9/64-in. choke, T.D. 6,616 ft.

Texon Royalty 5 Austin, 205 bbl., ⅛-in. choke, perf. casing 7,016-36 ft., T.D. 7,038 ft.

Ben Bolt, Jim Wells County: H. H. Howell 2 Johnson, 320 bbl., ⅞-in. choke, perf. casing 5,245-53 ft., T.D. 5,297 ft.

Clara Driscoll, Nueces County: Wellington 16 Driscoll, 12,600,000 cu. ft. of gas, open flow, perf. casing 3,655-68 ft., T.D. 3,821 ft.

Midway, San Patricio County: Pan American 1 Morris, dry, 6,710 ft.

Minnie Bock, Nueces County: E. A. Graham 4-A Gandy, 75 bbl., 9/64-in. choke, perf. casing 5,736-43 ft., T.D. 5,890 ft.

Graham 4 Rutland, dry, T.D. 4,025 ft.

Graham 3 Rutland, 42 bbl. jetting, perf. casing 3,708-12 ft., T.D. 3,840 ft.

Phillips 2 Crystal-Gandy, dry, T.D. 5,999 ft.

Odem, San Patricio County: Wellington 1 Lane, 132 bbl., ⅛-in. choke, perf. casing 5,324-28 ft., T.D. 5,425 ft.

Orange Grove, Jim Wells County: Kilgore Developers, 130 bbl., ⅛-in. choke, perf. casing 5,074-76 ft., T.D. 5,080 ft.

Plymouth, San Patricio County: Plymouth 120-C Welder, 89 bbl., 3/32-in. choke, perf. casing 6,139-44 ft., T.D. 6,145 ft.

Refugio, Refugio County: Hewitt & Dougherty 3 Reilly, 104 bbl., ⅛-in. choke, perf. casing 6,236-48 ft., T.D. 6,383 ft.

Seeligson, Jim Wells County: Transwestern 6 Dunlap, 109 bbl., 3/32-in. choke, perf. casing 5,968-70 ft., T.D. 6,055 ft.

Stratton, Nueces County: Southern Minerals 31 Stratton Community, 80 bbl., 3/32-in. choke, perf. casing 6,504-20 ft., T.D. 6,690 ft.

Southern Minerals 29 Stratton Community, 81 bbl., 7/64-in. choke, T.D. 6,690 ft.

SOUTH TEXAS

Wildcats

Jim Hogg County: Sun 1 Ramirez, dry, T.D. 4,507 ft.

McMullen County: Mabel Rossi 1 R. H. Brown, dry, T.D. 889 ft.

Starr County: F. A. Gillespie 1-A Guerra, dry, T.D. 1,324 ft.

Fields

Boyle, Starr County: Fain & Borsodi 1 J. P. Waite, dry, T.D. 4,520 ft.

Colorado, Jim Hogg County: Humble 37-B King, 38 bbl., ⅝-in. choke, T.D. 3,009 ft.

Jacob, McMullen County: Loma Oil Co. 111-A Jacobs, 5 bbl., pumping, sand 914-77 ft., T.D. 978 ft.

Kelsey, Starr County: Navarro 2 Trevino, 144 bbl., ⅞-in. choke, perf. casing 4,746-52 ft., T.D. 4,804 ft.

Lundell, Duval County: Government Wells 51 Lundell, 20 bbl., 4 hr., ⅝-in. choke, sand 1,546-54 ft.

Palangana, Duval County: F. J. Gravis 1 Schallert, dry, T.D. 2,895 ft.

Rincon, Starr County: Continental 113-B Slick, 182 bbl., ⅞-in. choke, perf. casing 4,134-54 ft., T.D. 4,182 ft.

South Calliham, McMullen County: E. M. Jones 100 Ezzell, dry, T.D. 1,090 ft.

SOUTH CENTRAL TEXAS

Wildcats

Maverick County: Continental 1 Frank Baker, dry, T.D. 2,400 ft.

Williamson County: Stolley & Mills 1 Burkhardt, dry, T.D. 2,111 ft.

Fields

Bee Creek, Caldwell County: Ralph Ogden 1-E Miears, 144 bbl., pumping, T.D. 2,207 ft.

Gas Ridge, Bexar County: Levitt Corning 4 Bitter, 1 bbl., pumping, sandy shale 476-95 ft., T.D. 508 ft.

Tenney Creek, Caldwell County: Ogden & Riddle 1-A Perry, 7 bbl., pumping, T.D. 2,539 ft.

SOUTHWEST TEXAS DRILLING REPORT

Bee County: Guy Warren 1 Josephine Chestnutt, John Roach Sur., 12 mi. northeast of Skidmore, 11-min. D.S. test 4,027-70 ft. tested 215 lb. working pressure, recovered 30 ft. of mud with slight show of oil, coring sandy shale 4,217 ft.

Brooks County: Standard Oil Co. of Texas 1 Hocker, Palo Blanco area, deepened from 5,510 ft. to 6,282 ft., P.B., perf. 5,075-88 ft., recovered salt water.

Duval County: H. H. Howell 1 Escabor, San Francisco grant, dry, T.D. 6,060 ft.

Luling Oil & Gas Co. et al 1 Salinas, Sec. 18, top Cockfield 5,174 ft., Pettus 5,193 ft., dry, T.D. 5,512 ft.

Gonzales County: Randon Oil Co. 1 Dunning, 8 mi. southeast of Gonzales, Joseph Dillard Sur., T.D. 4,991 ft., twisted off drill stem, fishing.

Hidalgo County: W. R. Davis 1 Jackson, Porcion 66, Block 10, Lot 3, drilling shale 300 ft.

La Gloria Corp. 1 Adams, La Blanca grant, Block 13, drilling shale 6,500 ft.

Jim Hogg County: Lon H. Cron 1 Hellen, Ygnacio Mora Sur. 24, 3 mi. east of Randado field, drilling sandy shale 3,285 ft.

V. F. Neuhaus 1 Marrs-McLean, Survey 20, drilling shale 3,228 ft.

Sun 1 Jones, Agua Nueva De Abajo grant, drilling shale 625 ft.

Jim Wells County: Gus Tsemelis 1 Joseph, 3 mi. northeast of San Diego, Jose Maria Garcia grant, W.O. 6,012 ft., may run casing to test showings logged in Frio-Vicksburg.

Live Oak County: C. G. Newton 1 Schule, S. B. Eves Sur., S.D. 1,700 ft.

Webb County: W. R. McBride 1 Garza, B.S.&F. Sur. 675, dry, T.D. 2,409 ft.

Transwestern 1 Puig, Albercas grant, dry, T.D. 2,134 ft.

Inside Test at James Pool Opens Deeper Pay Zone

By D. H. STORMONT

WICHITA FALLS, Tex., Oct. 27.—The 43-well James pool of Young County may expect an increase in drilling operations as a second deeper pay level was opened this week by W. E. Production Co. 1 B. W. King, Section 624, T.E.&L. Survey. No. 1 King was completed 4 years ago at a total depth of 3,903 ft. in the Caddo lime. Since then production has shown a steady decline and recently operator decided to clean out and deepen to the Marble Falls. A saturated section was encountered at 4,270-95 ft., total depth, and when tested, produced 600 bbl. of oil in 6 hours, flowing.

No. 1 King is in the center of the pool, opened in 1935, and is 8 miles northwest of the town of Graham. At the end of the week, tanks were being moved in and a production gage is scheduled as soon as storage can be erected.

SUMMARY OF COMPLETIONS

North Texas

	No.	Bbl.	Footage
Oil wells: K.M.A.	6	1,687	19,202
Sewell	3	970	9,265
Other fields	16	1,887	28,705
Dry holes: Miscellaneous pools	14	.....	15,138
Wildcats	5	.....	10,814
Total	44	.....	83,124

West Central Texas

	No.	Bbl.	Footage
Oil wells: Wimberly	2	700	4,577
Other fields	1	220	3,539
Gas wells: Brownwood gas	2	*16.5	3,326
Dry holes: Fields	2	.....	4,262
Wildcats	7	.....	10,403
Total	14	.....	26,107

*Million cu. ft.

Continental 1 Winder Encounters Deep Oil Show

Continental's deep wildcat in Montague County is drilling ahead on a 7,200-ft. contract, after recovering 1,840 ft. of oil and 340 ft. of salt water on a 20-minute drill-stem test from a saturated section in the conglomerate at 6,239-59 ft. In addition, the wildcat made air and gas along with the oil and water recovery. The test is Continental 1 Winder, Section 4, Limestone C.S.L. Survey, 7 miles northwest of Bowie.

In the same county, the newest discovery, Walter Gant 1 John Turner, Block 59, E. T. Survey, 5 miles northwest of Bowie, flowed 68 bbl. of oil in 2 hours after being shut in for over a week. The test is bottomed at 6,238 ft.

Test in Throckmorton County Shows Oil and Gas

In Throckmorton County the wildcat test of Nash and Windfohr at 1 R. L. Parrott showed oil and gas in a saturated section of the Caddo lime from 4,013-22 ft. The lime was topped at 4,003 ft. and drilled to 4,017 ft. Pipe was set at 4,000 ft. and after plug was drilled and mud swabbed, the test began to show oil. Operators are expected to treat the section with acid.

Outpost Staked in Young County

West of Dorian & Mitchell 1 N. B. League, which is showing for oil production, the same operators have staked a 4,500-ft. rotary test in the area east of Newcastle in Young County. The semiwildcat will be drilled as 2 C. B. Daniels. Location has been announced as 990 ft. from the east and 3,403 ft. from the south lines of Section 420, T.E.&L. Survey, 1,320 ft. west of 1 League.

Wildcat Staked in Clay County

Location for a 6,000-ft. wildcat test in Clay County, south of Haskell, has been staked by Superior of California on the G. W. Scaling estate, 2,600 ft. from the south and 1,200 ft. from the east lines of the NW cor. Section 2, H.&T.C. Survey. The test will be drilled on a block of approximately 3,000 acres.

Nearest production is 2 miles northeast in the Howard pool, producing from the Caddo lime at 5,461-84 ft. To the southeast, 4½ miles, is the Browning pool, which produces from the Strawn sand around 4,400 ft.

Development Rules Set for Two Young County Pools

The Railroad Commission last week issued field orders for the Burns-Larimore and Burns-Ragland pools of Young County. Well spacing was set at 933 ft. between wells and 467 ft. from property lines, with optional spacing of 933 ft. and 1,320 ft. Proration units were set at 20 acres, or at the election of the operator a density of one well to 40 acres may be used. Distribution of allowables was set on a 50 per cent per well and 50 per cent acreage basis. Maximum gas-oil ratio was set at 2,000 cu. ft. per barrel. Wells producing with higher ratios will be permitted to produce only that amount of oil which accompanies its daily gas limit volume.

NORTH TEXAS COMPLETIONS

Wildcats

Archer County: Charles Peachacek 1 Mary Peachacek, M. Fanning Sur., Abst. 128, dry at 1,180 ft.

Craig & Wilson 1 J. B. Frerick, Sec. 42, Blk. 5, Clark & Plumb Sur., dry at 933 ft.

H. Farmer 1 I. C. Elmore, Sec. 29, Blk. 5, Clark & Plumb Sur., dry at 1,304 ft.

Throckmorton County: Helmerich & Payne 1 J. M. Bachlor, Sec. 2119, T.E.&L. Sur., top Caddo 4,053 ft., Barnett shale 4,680 ft., Barnett lime 4,720 ft., Ellenburger 4,910 ft., dry at 5,112 ft.

Wichita County: Paul H. Sisk 1 Lola Ann Sisk, Sec. 15, Lge. 2, Denton C.S.L. Sur., Abst. 57, dry at 110 ft.

Young County: Consolidated and Ray Oil Co. 1 J. P. Dunagan, Sec. 163, T.E.&L. Sur., top Palo Pinto 2,203 ft., Caddo 4,197 ft., Barnett 4.860 ft., Mississippi 4,898 ft., show of oil 4,985-5,005 ft., treated with 9,000 gal. acid 3,345-55 ft., temporarily abandoned.

Fields

Briar Creek, Young County: Panhandle and Rankin 1 King & Wooten, Sec. 1977, T.E.&L. Sur., 62 bbl. in 24 hr., ½-in. choke, 45-qt. shot 2,780-85 ft., pay 2,799-2,804 ft., T.D. 2,814 ft.

Fargo, Wilbarger County: Anderson & Prichard Oil Corp. 1 C. E. Sears, Sec. 37, Blk. 15, H.&T.C. Sur., 46 bbl. in 6 hr., ½-in. choke, est. 175 bbl., T.D. 4,431 ft.

Hull-Silk, Archer County: Adonell Massie 10 Wilson, Sec. 23, Lot 4, A.T.N.C.L. Sur., 59 bbl. in 3 hr., ¾-in. choke, est. 190 bbl., 2,000 gal. acid 3,988-94 ft.

K.M.A., Wichita County: Hanlon-Buchanan et al 13-E Fasset & Tuttle, Sec. 4, S.D.&M.G. Sur., Abst. 572, 56 bbl. in 3 hr., ¾-in. choke on 2-in. tubing, est. 190 bbl., 60-qt. shot 4,002-34 ft., T.D. 4,036 ft.

Hanlon-Buchanan et al 18-E Fasset & Tuttle, Sec. 2, B.S.&F. Sur., Abst. 740, 27 bbl. in 3 hr., ¾-in. choke, est. 125 bbl., top K.M.A. lime 3,945 ft., 120-qt. shot 4,079-4,105 ft., T.D. 4,107 ft.

R-G Drilling Co. 3 W. L. Warren, Blk. 32, K.W.V.F. Lands Sur., 72 bbl. in 24 hr., pumping, pay 1,758-69 ft.

Tide Water and Perkins-Cullum 3 W. P. Ferguson, Sec. 6, W. H. Spiller Sur., Abst. 257, 73 bbl. in 3 hr., ½-in. choke, est. 290 bbl., T.D. 4,327 ft. in Ellenburger.

Shell Oil Co., Inc., and Phillips 37 W. C. Griffin, F. Jordan Sur., Abst. 167, 378 bbl. in 3 hr., ¾-in. choke, est. 1,000 bbl., top K.M.A. 3,650 ft., Ellenburger 4,226 ft., T.D. 4,278 ft.

C. F. Schran et al 1 Fred Daume, Sec. 1, S.P. Sur., 10 bbl. in 24 hr., pumping, T.D. 685 ft.

Mathis, Jack County: I. Worsham 5-A C. C. Leach, C. M. Snodgrass Sur., Abst. 1314, 64 bbl. in 2 hr., 2-in. open tubing, est. 400 bbl., 15-qt. shot 2,926-36 ft.

Nocona, Montague County: Bridwell Oil Co. 3 T. and H. Begley, William Donoho Sur., Abst. 170, 7 bbl. in 24 hr., pumping, T.D. 823 ft.

T.C.U., Cook County: E. W. Mudge, Jr., 7 C. J. Fette, Charles-Carter Sur., Abst. 1190, 12 bbl. in 24 hr., pumping, T.D. 1,119 ft.

Voth, Cook County: Humble 2 G. H. Hellman, John Trussell Sur., Abst. 1225, 15 bbl. in 24 hr., pumping, T.D. 1,227 ft. (old well drilled deeper).

Sewell, Young County: Henry Zweifel 5 M. E. Martin, R. W. Nabor Sur., Abst. 213, 120 bbl. in 5 hr., ½-in. choke, est. 300 bbl., 2,495-2,507 ft.

Cosden Pet. Corp. 5-A R. D. Sewell, M. Case Sur., Abst. 1402, 84 bbl. in 4 hr., ⅝-in. choke, est. 350 bbl., 2,500 gal. acid 4,168-88 ft., T.D. 4,223 ft.

Henry Zweifel 5-C D. R. Sewell, W. McDowell Sur., Abst. 1620, 187 bbl. in 8 hr., ¾-in. choke, est. 320 bbl., 2,525-35 ft.

Miscellaneous Fields

Archer County: Harris & Taylor 1 Anne Campbell, Sec. 2, S.P.R.R. Sur., Abst. 815, dry at 1,380 ft.

Petroleum Producers Co. 24-D J. T. Richardson, Blk. 1, S. Anderson ranch, 60 bbl., pumping, 1,251-60 ft.

Clay County: Johnson & Kouri 8 C. T. Taylor, Sec. 29, Bacon subd., dry at 1,153 ft.

Johnson & Kouri 2 C. T. Taylor, Sec. 40, Bacon subd., dry at 251 ft.

W. H. Metzner 23 C. T. Taylor estate, Sec. 23, B.B. B.&C. Sur., Abst. 67, dry at 1,186 ft.

Harper & Knappenberger 5 Paul Bilbrey, Sec. 3, W. Wyatt subd., 17 bbl. in 7 hr., pumping, est. 25 bbl., 9½-qt. shot 1,152-57 ft., P.B. from 1,192 ft., T.D.

Homer Lee et al 1 T. D. Wiley, Sec. 16, Pratt Past. subd., dry at 2,101 ft.

Cook County: Kewanee Oil Co. 18-B R. J. Timmis, E.T. R.R. Sur., Abst. 363, dry at 2,042 ft.

Seitz, Comegys & Seitz 14 R. B. Poteet, Stephens Sur., Abst. 1001, dry at 1,440 ft.

Trumter Oil Co. 26-B Andress Bros., J. Clark Sur., Abst. 194, 10 bbl. in 24 hr., pumping, 5-qt. shot, T.D. 756 ft.

Throckmorton County: Consolidated Oil Co. 2 T. S. Cooke, Sec. 6. Comanche Indian Reservation Sur., dry at 744 ft.

R. F. Gilliman estate 1 Susie Tuton, Sec. 2, A. J. Kemp Sur., Abst. 1369, 7 bbl. in 24 hr., pumping, 736-43 ft.

Wichita County: Rubson, Switzer & Winder 18-A A. W. McClure, Sec. 5, G.C.&S.F. Sur., Abst. 363, 8 bbl., pumping, 800-17 ft.

Petroleum Producers Co. 1 J. E. Roller, Sec. 3, C.T. R.R. Sur., Abst. 50, dry at 294 ft.

W. H. Hammon 7 Nellie M. Johnson, H. Hastie Sur., Abst. 92, 110 bbl., pumping, 1,292-1,318 ft.

C. H. Morrison 1 J. L. Powell, Sec. 21, H.&G.N. Sur., Abst. 142, dry at 1,902 ft.

G. W. Griffith 1 Ross W. Porter estate, Sec. 32, Blk. 5, H.&T.C. Sur., dry at 555 ft.

Hanlon-Buchanan 8-A T. L. Burnett et al, Sec. 34, H.&G.N. Sur., Abst. 435, 8 bbl., pumping, 720-28 ft.

Shell and Phillips 35 N. C. Griffin, F. Jordan Sur., Abst. 167, 305 bbl. in 3 hr., ¾-in. choke on 2-in. tubing, est. 800 bbl., 1,000 gal. acid, top K.M.A. 3,802 ft., Ellenburger 4,392 ft., pay 4,392-4,496 ft.

Wolf & Hull 10 Fred Daume, Sec. 1, S.P.R.R. Sur., 10 bbl., pumping, 703-05 ft.

Young County: H. B. Streit 6-C J. W. Jacks, Sec. 23, Young C.S.L. Sur., Abst. 1284, 3 bbl. in 24 hr., pumping, 14-qt. shot 525-55 ft., pay 549-59 ft., P.B. from 573 ft., T.D.

J. G. Wooten et al 1 King-Hawkins, Sec. 2, G.B.&N. Sur., Abst. 120, dry at 495 ft.

Collins & Riley 3 A. L. Porter, W. Cantwell Sur., Abst. 1393, dry at 625 ft.

Marie Eckert 1 T. Gadberry, Sec. 227, T.E.&L. Sur., dry at 970 ft.

WEST CENTRAL TEXAS

FORT WORTH, Tex., Oct. 27.—At the present time West Central Texas is enjoying its most intensive wildcat drilling campaign of the past several years. This week, 44 wildcats were reported in the actual process of drilling. Callahan and Coleman counties have the greatest number of active operations, with six each, while Jones, Shackelford, and Stephens counties have four each.

Concho County Discovery Pumping

Floyd C. Dodson 1 Robert Wilson, Concho County discovery, 10 miles southwest of Eden, pumped and headed 5 bbl. of oil per hour, early this week along with some acid water, after a 2,000-gal. acid treatment. The results of the acid treatment could not be determined, however, because a 140-bbl. oil load has not been recovered.

After the recovery, the test will be reacidized with 3,000 gal. It is reported that operator plans to pull tubing after the second treatment and swab through casing.

No. 1 Wilson was plugged back recently from 4,094 ft. to 3,748 ft. and 7-in. casing set at that depth. Location is 425 ft. from the south and 1,250 ft. from the west lines of Thomas Green Survey 1.

Deeper Pay for McMillan Pool, Runnels County

In the old McMillan pool of Runnels County, Hightower Oil & Gas has completed 1-A Brevard, Subdivision 21, Travis Survey 333, for 70 bbl. of oil daily, pumping. No. 1-A Brevard was deepened to 3,349 ft. and found pay in the sand at 3,316-23 ft. This is a deeper pay horizon for the pool.

Two Wildcats Staked in Comanche County

A scheduled 2,900-ft. wildcat test 4 miles southeast of DeLeon in Comanche County has been staked by Clyde D. Lane at 1 W. T. Hazzard. The cable-tool test will be drilled on a 50-acre lease in the M. S. Hatton Survey.

One mile west of the town of Energy in the same county, A. H. Woodfin will drill a 3,500-ft. wildcat on a 2,000-acre block. The test is located in the southwest corner of the C. S. Robertson tract in the Elizabeth Tatum Survey.

(Continued on Page 184)

Workovers and New Starts Keep Caddo Field Active

By R. MARNE SANFORD

SHREVEPORT, La., Oct. 27.—The ever growing exploitation of Central Louisiana's Wilcox producing fields contributed 14 out of a total of 22 tests during the past week. Of the 20 completed oil wells, two were in the Olla field, and six in the Nebo and Little Creek fields, all in La Salle Parish. The Caddo field contributed four oil wells and the Sligo and Urania fields one each.

H. L. Hunt interests of Dallas, Tex., are still taking the lead in the entire Wilcox development play, both in proven area and in wildcat territory. H. L. Hunt completed seven new oil wells the past week, and his Placid Oil Co. finaled six wells. The one wildcat failure was drilled by Hunt as 10-F Goodpine, NE SE 34-9n-1w, which topped the Wilcox at 1,862 ft. and was quit at 4,476 ft.

SUMMARY OF COMPLETIONS

North Louisiana

	No.	Bbl.	Footage
Oil wells: Bellevue	2	19	820
Caddo	4	141	5,668
Little Creek	6	798	17,907
Nebo	6	788	25,218
Olla	2	145	4,788
Sligo	1	60	3,189
Urania	1	50	1,504
Dry holes: Wildcats	1	.....	4,476
Caddo	1	.....	2,420
Total	24	.....	65,990

Arkansas

	No.	Bbl.	Footage
Oil wells: Stephens	1	120	3,450
Gas wells: McKamie	1	*1.2	9,350
Dry holes: Fouke	1	.....	3,756
Stephens	1	.....	3,650
Total	4	.....	20,206

East Texas Border

	No.	Bbl.	Footage
Oil wells: Wildcats	1	50	2,343
Gas wells: Carthage	1	*0.03	4,959
Total	2	.....	7,302

*Million cu. ft.

Inside Drilling Contributes

Most of Caddo's Activity

After almost 40 years the old Caddo-Pine Island field of Caddo Parish still contributes new wells each week. The work in this old field is mainly the redrilling of old wells and the drilling of new ones in the old semi-depleted parts of the field. Many producing levels have yielded oil at the Caddo field, however, the majority of the drilling at present is projected to the old Hutton lime. Wells are being located between the old producers and in most cases some sort of commercial well is found, however, usually the oil yield is accompanied by about 20 per cent water. During the past 3 or 4 years small areas bordering the large field have been found productive and some drilling is present in these areas. As of the close of the past week there were 18 active tests in the field. There were four tests shut down for orders and two standing locations, making a total of 24 operations in the field.

Claiborne Wildcats Near Critical Depths

Three wildcats seeking new Smackover lime fields for North Louisiana, were at critical depths at the close of the week. At Haynesville, T. L. James 1 Akin, 27-23-8, was last reported drilling ahead below 3,502 ft. In the same county Hunt Oil Co. 1 Mitchiner, SW SE 15-23-7, was drilling at 8,215 ft. after topping the massive anhydrite at 3,897 ft. and basing it at 4,088 ft. The Union Producing Co. 1 McDonald, 13-21-1, was drilling at 8,010 ft.

Cypress Bayou Area Active

The previously named Walters field about on the parish line between Catahoula and La Salle parishes, has been renamed the Cypress Bayou field. Several weeks ago the Larto Lake field was discovered just to the southeast and in Catahoula Parish. At present the entire intervening area between these two fields is undergoing wildcat exploration. Newest location for the area is Carter 4 Delta Land Co., SW SW SE 12-6-4e. At Cypress Bayou, Carter was taking side-wall cores at 6,095 ft. in the 1-E Tensas Delta Land Co. In 1-G Tensas, the Carter Oil was drilling at 5,775 ft. Near Larto Lake's discovery well, Carter was below 5,652 ft. in 2-B Tensas. Much of the acreage between these two fields is expected to yield commercial production from the deep Wilcox zone and thus will necessitate the probable drilling of future wells over water since most of the area is low and swampy and will be partially water covered with the fall rains.

NORTH LOUISIANA COMPLETIONS

Wildcat

Grant Parish H. L. Hunt 10-F Goodpine, NE SE 34 9n-1w, top Wilcox 1,862 ft., dry at 4,476 ft.

Fields

Bellevue, Bossier Parish: Premier Investment Co. 60 Wyche, SE NW 14-19n-11w, 5 bbl., 420 ft., T.D.
Premier Investment Co. 62 Wyche, SE NW 14-19n-11w, 50 bbl. oil and 14 bbl. water, 400 ft., T.D.

Caddo, Caddo Parish: Davies & Hart 9-A Muslow, SW NE 5-20n-15w, 30 bbl. oil, 1,503 ft.
Claude Ferguson 3-B Chew, SE NW 4-20n-16w, 15 bbl. oil, 933 ft.
Magnolia 36 Sloan-Thigpen, SW NE SE 6-20n-15w, 50 bbl. oil and 16 bbl. water, 1,542 ft.
McDonald & Campbell 1 Youree, SW NE 13-20n-15w, dry at 2,420 ft.
Stanolind 142 Dillon, NE SW 13-21n-15w, 46 bbl. oil and 52 bbl. water, 1,690 ft.

Little Creek, La Salle Parish: H. L. Hunt 45-F Goodpine, NE SE 30-9n-2e, 128 bbl. oil and 17 bbl. water, 2,402-12 ft., T.D. 2,705 ft.
H. L. Hunt 46-F Goodpine, SE NE 30-9n-2e, 118 bbl. oil and 30 bbl. water, 2,436-39 ft., T.D. 4,036 ft.
H. L. Hunt 47-F Goodpine, SW NE 30-9n-2e, 128 bbl. oil and 23 bbl. water, 2,405-12 ft., T.D. 2,995 ft.
H. L. Hunt 48-F Goodpine, NW SE 30-9n-2e, 141 bbl. oil and 16 bbl. water, 2,386-94 ft., T.D. 2,-727 ft.
Placid Oil 13-A Tremont, NW SE 24-9n-1e, 156 bbl. oil, 2,474-79 ft., T.D. 2,736 ft.
W. O. Woodard 1 Goodpine, SE SW 24-9n-1e, 127 bbl. oil, 2,453-56 ft., T.D. 2,708 ft.

Nebo, La Salle Parish: Placid Oil 2 Gray, SE NW 38-7n-3e, 145 bbl. oil and 9 bbl. water, 3,652-56 ft., T.D. 4,090 ft.
Placid Oil 2 Dorsey, SE SE 10-7n-3e, 113 bbl. oil and 63 bbl. water, 3,990-92 ft., T.D. 4,078 ft.
Placid Oil 1 Couch, NW SW 28-8n-3e, 124 bbl. oil and 4 bbl. water, 3,474-76 ft., 4,197 ft., T.D.
H. L. Hunt 63-F Goodpine, SE SW 16-7n-3e, 130 bbl. oil and 55 bbl. water, 4,074-78 ft., T.D. 4,396 ft.
H. L. Hunt 33-A Goodpine, NW NW 15-7n-3e, 131 bbl. oil and 44 bbl. water, 3,980-88 ft., T.D. 4,-282 ft.
H. L. Hunt 32-A Goodpine, SE NE 16-7n-3e, 145 bbl. oil and 28 bbl. water, 3,988-92 ft., 4,175 ft., T.D.

Olla, La Salle Parish: Placid Oil 93 Louisiana Central, SE NW 26-10n-2e, 34 bbl. oil, 2,201-08 ft., 2,422 ft., T.D.
Placid Oil 96 Louisiana Central, SW SE 23-10n-2e, 111 bbl. oil and 12 bbl. water, 2,181-98 ft., 2,366 ft., T.D.

Sligo, Bossier Parish: Triangle Drilling Co. 4 Jeter-Webb, SW NE 23-17n-12w, 60 bbl. oil, 3,189 ft., T.D.

Urania, La Salle Parish: Arkansas Fuel Oil W-A-8 Urania Lbr. Co., NE SW 2-9n-1e, 50 bbl. oil, 1,504 ft., T.D.

Nacatoch Production Found East of Stephens

Possibility of a new oil field in Ouachita County was seen at the close of the week at the Lee Bergman 2 Cook, NW SW 27-15-18, in wildcat territory 6 miles from the Stephens field. The test was last reported bailing and recovering what was said to be commercial quantities of oil from the Nacatoch sand at 1,616 ft. Accurate gage will not be available until it is placed on the pump, however, some estimates were from 100 to 300 bbl. daily. Lease and royalty trading was brisk at the close of the week.

Dorcheat Outpost Gets Some Water

The promising outpost test to the Dorcheat field which was last week thought to be a good well, was again bothered by salt water. It is Southwood Oil 2 Hunt, 14-18-22, on the east side of the field. The hole was plugged back and tested from 8,897-8,903 ft. The salt water was believed to be from a source that could be extinguished. Tubing pressure was 1,200 lb. on the last gage and the casing pressure showed 1,026 lb. It is shut in at present for further testing the first of the week. Two locations north of the outpost, Delta Drilling Co. has completed derrick and is rigging up rotary at its 1 Hunt, 11-18-22, another outpost attempt for production.

Wildcat Spotted

Barnsdall Oil Co. has made location for a deep wildcat test in Lafayette County which will start at once. Seeking production from the deep Smackover lime, the test is 1 E. S. Bond, located in NW SW 11-15s-24w. Material has been moved to the location and rigging up is under way.

ARKANSAS COMPLETIONS

Fields

Fouke, Miller County: H. L. Hunt 1 Fouke, NE SW 34-16s-27w, dry at T.D. 3,756 ft.

McKamie, Lafayette County: Carter Oil 2 Cornelius, SW NE 31-17s-23w, 1,181,000 cu. ft. sour gas, 216 bbl. distillate daily, 50.2° gravity, perf. casing 9,270-90 ft., T.D. 9,350 ft.

Stephens, Columbia County: R. H. Crowe 1 Heard, SE NW 13-15s-20w, dry at T.D. 3,650 ft.
G. H. Vaughn 2 Smart, SE NW 13-15s-20w, 120 bbl., 3,394-3,403 ft., T.D. 3,450 ft.

EAST TEXAS BORDER COMPLETIONS

Wildcat discovery, Shelby: Ce-Beth Oil 1 Pickering, Patterson Sur., 50 bbl. daily, 3,343 ft.

Carthage, Panola County: Turner & Smith 1 Dunaway, Cotton Sur., 25,000,000 cu. ft. gas, 4,959 ft., T.D.

AVERAGE DAILY PRODUCTION

NORTH LOUISIANA

	Oct. 25	Oct. 18
Caddo light	6,375	6,360
Caddo heavy	2,200	2,210
Cotton Valley	16,235	16,185
Cross Lake	2,685	2,710
De Soto and Red River	1,030	995
Haynesville	2,695	2,640
Homer	2,965	2,950
Lisbon	2,690	2,750
Little Creek	2,815	2,310
Nebo	4,300	3,805
Olla	13,740	13,630
Rodessa	13,695	13,710
Sligo	2,540	2,510
Sugar Creek	1,555	1,550
Urania	2,275	2,295
Zwolle	990	985
Total North Louisiana	81,295	80,155

SOUTH ARKANSAS

Atlanta	2,860	2,865
Buckner	2,335	2,335
Champagnolle	960	975
Dorcheat	1,750	1,775
El Dorado	1,450	1,465
Magnolia	18,950	18,930
Nick Springs	725	735
McKamie	2,315	2,200
Rodessa	1,165	1,210
Schuler	16,560	16,650
Smackover light	1,820	1,850
Smackover heavy	12,575	12,760
Troy	2,750	805
Urbana	2,750	1,105
Village	950	945
Total South Arkansas	71,945	71,845

Illinois Fields

(Continued from Page 165)

Rural Hill, Hamilton County: Shell 1 J. F. Crabtree, NE NE SE 14-6s-5e, flowed 381 bbl. oil and 3 bbl. water, 5,000 gal. acid, perf. 3,174-3,200 ft., McClosky 2,387-90 ft., Rosiclare 3,176-98 ft., T.D. 3,362 ft., P.B. 3,234 ft.
Cameron 2 Lockwood, SE NE NW 23-6s-5e, pumped 248 bbl., 40-qt. shot 3,105-22 ft., Aux Vases 3,092-3,120 ft., T.D. 3,124 ft.
Oil Management 1 Lockwood, NE NW NW 23-6s-5e, flowed 784 bbl., 50-qt. shot 3,106-29 ft., Aux Vases sand 3,096 ft., T.D. 3,131 ft.

Walpole, Hamilton County: Texas 3 C. Johnson, NE SE SE 27-6s-6e, dry at 3,248 ft., Glen Dean 2,460 ft., Hardinsburg 2,535 ft., Golconda 2,585 ft., Barlow 2,720 ft., Cypress 2,725 ft., Paint Creek 2,935 ft., Aux Vases 3,051 ft., Ste. Genevieve 3,105 ft., McClosky 3,182 ft.

Woodlawn, Jefferson County: Magnolia 3 Rynski, NE NE SE 34-2s-1e, pumped 64 bbl. oil and 20 bbl. water, 10-qt. shot 2,002-06 ft., Benoist 1,988 ft., T.D. 2,009 ft.
E. M. Self 3 Zinke, S½ SW SW NW 35-2s-1e, pumped 48 bbl., 30-qt. shot 1,994-2,001 ft., Benoist 1,990 ft., T.D. 2,001 ft.
McBride 1 Piper B, NW NW NW NE 1-3s-1e, pumped 138 bbl., 10-qt. shot 1,985-93 ft., Benoist 1,982 ft., T.D. 1,994 ft.
Texas 1 G. Robinson, NE SE NW 1-3s-1e, pumped 72 bbl., 1-qt. shot 1,990-91 ft., Benoist 1,987-95 ft., T.D. 1,995 ft.
Texas 3 J. Schmidt, NE SW NW 1-3s-1e, pumped 79 bbl. in 6½ hr., 20-qt. shot 1,920-34 ft., Benoist 1,920-34 ft., T.D. 1,935 ft.
Magnolia 1 J. J. Kaminski, SE NW SE 2-3s-1e, pumped 102 bbl., 10-qt. shot 1,961-64 ft., Benoist 1,953 ft., T.D. 1,964 ft.

Turnbull Canyon Discovery Well Makes 125 Bbl.

By L. P. STOCKMAN

LOS ANGELES, Calif., Oct. 27.—Continental Oil Co., headed in California by Roy E. Collom, vice president, discovered its second field in a month when its wildcat in Turnbull Canyon was successfully completed a few days ago. The company's new wildcat which is located in the Whittier district of Los Angeles County has settled to 125 bbl. per day of clean 24.9-gravity oil but this is believed to be pump trouble rather than inability of the well to hold up to its initial of 225 bbl. daily. The fluid level is at 1,300 ft.

Continental's initial discovery in California this year was in the Shafter district of Kern County but there is still some doubt as to the commercial possibilities of the Shafter field due to the depth of the well, 12,811 ft., and the relatively small production. Subsequent drilling, however, may be productive of better results as the initial well indicates beyond any doubt that there is an accumulation of oil and gas present. The only thing remaining to be determined is whether there is sufficient production possible to justify this deep drilling.

Continental's Turnbull Canyon discovery is bottomed in oil sand at 3,447 ft. and has 5½-in. casing cemented at 3,373 ft. The productive formation is believed to be upper Puente which is of upper Miocene age. The structure as outlined is an anticlinal nose cut off by a fault but some operators have leased on the assumption that Continental's Turnbull Canyon discovery is an accumulation against a fault. While it will take some additional wells to definitely determine the type of structure, it is assumed that Continental's geological department, headed by Roy Barnes as chief geologist, knows more about the structure than any other.

This discovery reflects excellent geological surface work in outlining the structure and a seismograph was only employed to confirm geologic deductions and to prove up the closure. Continental Oil Co. has considerable acreage under lease in the new Turnbull Canyon field and is, therefore, in a position to benefit greatly by the discovery. This field has the advantage of low drilling costs in comparison with Wasco, which Continental also discovered, and Shafter which the company is now pioneering. It has been a long time since a new field was discovered in Los Angeles Basin as Aliso Canyon, Newhall-Potrero, Del Valle and Oak Canyon are classified with the Ventura-Newhall group.

SUMMARY OF COMPLETIONS

	No.	Bbl.	Footage
Oil wells: San Joaquin Valley	7	5,276	47,806
Coastal district	1	106	6,090
Los Angeles Basin	8	2,336	37,610
Dry holes: Wildcats	1	.....	9,000
Total	17		100,506

Wilmington Has Liveliest Drilling Campaign in the State

The Wilmington field of Los Angeles Basin in addition to heading the production list is the most active field in the state from a drilling standpoint and there is nothing to indicate a reduction in drilling provided drilling equipment is available. A total of 1,070 wells have been completed in the Wilmington field to date and a number have been finished around the edges of the field in the Ranger zone which extends almost as far north as Watson and westward to the Torrance field. Production of this field comes from the Ranger and upper and lower Terminal zones and the 1,070 wells completed to date are producing from one or more of these three zones.

The so-called tar zone has only been produced in a few wells but this horizon is quite productive in the Long Beach Harbor section of the field and will later be produced. The Ford zone of Miocene age is the lowest zone in the Wilmington field but this horizon has been allowed to remain in its virgin state due to the desire of operators to keep this zone for the proverbial rainy day or when the upper zones become depleted. Existence of the Ford zone has been known since discovery of the field as General Petroleum Corp. cored this horizon but did not produce it. When Secretary Ickes stated that California and Illinois were producing wide open he forgot to take into consideration this virgin zone and another 2,500 wells that have been shut in for several years.

Inglewood Deep Development Proceeding Slowly

Deep zone exploitation in the Inglewood field of Los Angeles County has been proceeding very slowly and there is nothing to indicate any change in the rate of drilling. It had been anticipated that operators holding potentially productive acreage nearer the apex of the structure would drill several lines of offset wells but to date development work has been limited to the extreme northwest end of the structure. A total of 14 successful completions has resulted from deep zone development of the Sentous zone of Miocene age to date and there are five drilling wells under way at present. This indicates the slow methodical way in which this field is being drilled in contrast with the fast competitive race down to the pay that characterized Pliocene development a number of years ago. A uniform casing and location program was agreed upon several months ago but it will not be necessary to use it until development work is extended.

LOS ANGELES BASIN COMPLETIONS

Dominguez, Los Angeles County: American Seamless Tube Corp. 1 Dasteel, 32-3s-13w, pumped 30 bbl., 27-gravity, 50 per cent cut, T.D. 8,209 ft., P.B. 8,116 ft., perf. 21 holes 7,455-70 ft., 5 holes 7,565-70 ft., 6 holes 7,504-15 ft., located extreme southwestern end of the field, completed in seventh Callender zone.

Inglewood, Los Angeles County: Jergins Oil Co. 2 Howard, 7-2s-14w, flowed 870 bbl., 31.2-gravity, 0.8 per cent cut, 700,000 cu. ft. gas, 30/64-in. bean, pressure 850/1,250 lb., T.D. 8,422 ft., perf. 7,911-8,422 ft., completed in Sentous zone of Miocene age.

La Mirada wildcat district, Orange County: Texas Co. 1-A McNally, 22-3s-11w, abandoned as unproductive at T.D. 9,000 ft., stratigraphically lower than Meyer zone at Santa Fe Springs, no showings of importance, gray sand was found in Foix, Bell and Meyer intervals, low-angle thrust fault drilled through at 5,800 ft.

Long Beach, Los Angeles County: Victory Oil Co. 3-19 Dominguez, 11-4s-13w, pumped 41 bbl., 25.9-gravity, 1.5 per cent cut, T.D. 8,402 ft., redrilled 7,634 ft., perf. at intervals 7,462-7,600 ft., redrilled from 6,015 ft. and recompleted in lower zone of Pliocene age.

Torrance, Los Angeles County: First National Finance Corp. 2 Capitol, 30-4s-13w, pumped 120 bbl., 16.6-gravity, 12 per cent cut, T.D. 3,715 ft., perf. 3,130-80 ft., 3,225-3,300 ft., 3,535-3,713 ft., completed in equivalent of Ranger zone.

Turnbull Canyon, Los Angeles County: Continental 1 Turnbull Canyon, 13-2s-11w, pumped 225 bbl., 25.1-gravity, 4 per cent cut, T.D. 3,447 ft., erected small pumping derrick and installed pumping equipment, discovery well in new field.

Wilmington, Los Angeles County: Continental Dev. Co. 26 Harbor, 10-5s-13w, pumped 160 bbl., 14.2-gravity, 3 per cent cut, T.D. 3,460 ft., perf. 3,149-3,455 ft., completed in Ranger zone of Pliocene age.

General Pet. 1 Seaside, 3-5s-13w, flowed 471 bbl., 18.5-gravity, 4 per cent cut, 330,000 cu. ft. gas, 31/64-in. bean, pressures 400/725 lb., T.D. 3,900 ft., perf. 2,839-3,333 ft., 3,361-3,627 ft., 3,654-3,762 ft., 3,803-99 ft., completed in Ranger and Terminal zones.

Union Pacific R. R. 204 fee, 4-5s-13w, pumped 369 bbl., 21.1-gravity, 1.7 per cent cut, T.D. 2,830 ft., perf. 2,550-53 ft., 2,573-2,630 ft., 2,640-2,830 ft., completed in Ranger zone.

Wilmuth Pet., Inc. 5 Community, 29-4s-13w, pumped 91 bbl., 15.5-gravity, 30 per cent cut, T.D. 3,720 ft., perf. 3,070-3,140 ft., 3,190-3,290 ft., 3,410-3,630 ft., 3,670-3,719 ft., completed in Ranger and upper Terminal zones.

LOS ANGELES BASIN OUTPOSTS OR DEEP TESTS

Dominguez, Los Angeles County: Decker and Associates 1 Frome, 29-3s-13w, T.D. 7,268 ft. in oil sand, 7-in. casing cemented 7,247 ft.

Inglewood, Los Angeles County: Federal Oil Co. 2 Smith, 7-2s-14w, T.D. 8,184 ft., redrilling 8,092 ft.

Hogan Pet. Co. 3-A Machado, 7-2s-14w, drilling 7,810 ft. in sand and shale.

Jefferson Oil Co. 2 Smith, 7-2s-14w, erected derrick.

Standard 2-12 Vickers, 7-2s-14w, T.D. 8,300 ft. in oil sand and shale, Nodular shale 7,740 ft., almost got away while pulling tester, completing.

Texas 8 Smith, 7-2s-14w, T.D. 3,412 ft. in oil sand, top Nodular 7,840 ft., redrilling 6,992 ft., elev. 242 ft.

Tide Water Associated 71 Vickers, 7-2s-14w, grade.

Tide Water Associated 72 Vickers, 7-2s-14w, drilling 4,593 ft. in sand and shale, elev. 350 ft.

Potrero, Los Angeles County: Tide Water Associated 5 Cypress, 34-2s-14w, rigged up.

Torrance, Los Angeles County: Jergins Oil Co. 1 Dominguez, 5-4s-14w, drilling 3,657 ft. in shale and oil sand, running higher than previous wells in area.

LOS ANGELES BASIN WILDCATS

Huntington Beach district, Orange County: La Bolsa Rancho Syndicate 1 La Bolsa, 22-5s-11w, rigging up.

Palos Verdes district, Los Angeles County: Newton Dev. Co. 1 P.V., 13-5s-15w, drilling 3,970 ft. in schist basement, will abandon.

Puente district, Orange County: Sunset Oil Co. 1 Baldwin, 11-2s-11w, T.D. 4,681 ft. in hard gray sand and black shale with streaks of conglomerate and oil sand, top Kraemer shale 3,888 ft., making production test but looks wet.

L. J. Altchuler 1 Larry, 30-2s-9w, T.D. 1,256 ft. in brown shale and gray sand, bailer sample showed little oil, will abandon, elev. 960 ft.

J. F. Kosanke 1 Puente, 24-2s-10w, drilling in sand and shale 1,823 ft., swabbing water with scum of oil.

Rio Hondo district, Los Angeles County: Potrero Oil Co. 1 Newman, 32-1s-11w, rigged up, located 1 mile north of eastern tip of Montebello field.

Seal Beach, Orange County: South Basin Oil Co. 1 Heller, 6-5s-11w, drilling 7,950 ft. in Repetto sand and shale, is joint test of South Basin Oil Co., Johnston Drlg. Co. and Allied Pet. Co.

Whittier district, Los Angeles County: Los Nietos Valley Oil Co. 1 Los Nietos, 29-2s-11w, rigged up.

Union 13 Sansinena, 30-2s-10w, derrick erected.

AVERAGE DAILY PRODUCTION

	Oct. 25	Oct. 18
Wilmington	86,375	88,450
Midway-Sunset	44,000	48,950
Coalinga	40,550	44,800
Kettleman North Dome	39,700	40,500
Ventura Avenue	39,550	37,875
Long Beach	37,550	38,125
Huntington Beach	28 850	33.050
Dominguez	24,725	24,025
Santa Fe Springs	22,200	22 850
Santa Maria Valley	19,125	20,875

San Joaquin Valley Has Another New Oil Field

Next week should witness the official completion of Amerada's Helm wildcat in Fresno County and upon completion of the production test California will have another new oil field in the San Joaquin Valley. Amerada's wildcat is 31-34 Clover in 34-26s-17e, and all that remains is to turn the well loose into the tanks as three zones have already been found productive on formation tests and completion is considered a mere formality. This wildcat is bottomed in Cretaceous at 10,257 ft. but has been plugged back to 8,005 ft. and production will be developed above the plug.

One zone has been found productive in the Eocene and two upper zones in rocks of Miocene age have likewise flowed on formation tests. It is interesting to note that all three zones have yielded high gravity oil ranging from 60° to 65° which places it in the range of a condensate. It is the present intention of the company to produce the intermediate zone which is in basal Miocene as this horizon shows the lowest and most favorable gas-oil ratio.

Amerada Petroleum Co. appears to control all of the potentially productive acreage in the Helm field as the well is in the center of a large block aggregating several thousand acres. This company has experienced considerable success in its California prospecting as to date Amerada has discovered the Rio Vista and Tracy gas fields in the San Francisco Bay region and the Northeast Coalinga and Helm fields in Fresno County. Amerada Petroleum's next California wildcat will be drilled in the Riverdale district of Fresno County as a seismograph survey of that region showed the existence of favorable structure. The initial wildcat will be drilled on the Lauton property in 26-17s-19e, and will be designated as 45-26 Lauton. The Riverdale district has considerable merit and may turn out to be California's next oil field a few months hence.

Seaboard Completes Well In Raisin City Field

Seaboard Oil Corp., drilling a joint test for Tide Water Associated Oil Co., Union Oil Co. and Seaboard, successfully completed 88-13 S.T.U. in the Raisin City field of Kern County and thus became the second operator to secure production in this field which was discovered by Shell Oil Co., Inc., a few months ago. These three operators, Seaboard, Union and Tide Water, hold a lease on 640 acres in 13-15s-17e, which adjoins the property on which Shell finished its discovery well and they should, therefore, prove to be prime factors in the development of the Raisin City field.

Shell's next well in this field will be 31-19 Santa Ana & Fresno Land Co. in 19-15s-18e, which is southeast of Seaboard's current completion. This field is still in the primary development stage and while it is

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too early to venture a prediction as to its probable future importance from a production standpoint one would feel a little more certain if a greater thickness of oil sand was found. To date the oil zones have been rather limited in extent but if the Raisin City field is to prove of primary importance as far as production is concerned the field must yield a greater thickness of oil sand.

Voluntary Curtailment at North Belridge May Continue

Operators are nearing completion of the first 30-day period of voluntary curtailment in excess of that prescribed by the Conservation Committee in the North Belridge field of Kern County and present indications point to the probability that the initial curtailment period will be prolonged for an indefinite length of time. This additional curtailment was considered advisable in order to prevent underground waste through large withdrawals of natural gas and consequent reduction of bottom-hole pressures and loss of possible recoverable crude oil.

Within a short time after approval of this program, operators had shut in 34 high gas-oil ratio wells and pinched in another group. The reduced gas production of the North Belridge field was about 65,000,000 cu. ft. daily and likewise reduced crude-oil production in proportion although some low gas-oil ratio wells were opened up slightly. In addition to reducing gas production, operators began injecting 16,000,000 cu. ft. of gas back into the formation. The North Belridge field has been subjected to an engineering study during the past several months and the present program is the outgrowth of recommendations resulting therefrom.

SAN JOAQUIN VALLEY COMPLETIONS

Coalinga Southeast, Fresno County: Superior 7 Husong, 18-19s-16e, flowed 2,020 bbl., 26.2-gravity, 0.1 per cent cut, 1,136,000 cu. ft. gas, 64/64-in. bean, pressures 500/750 lb., T.D. 8,187 ft., perf. 8,013-15 ft., 8,150-60 ft., 8,170-85 ft., completed in Gatchell oil sand, Kreyenhagen 6,773 ft., green sand 7,613 ft., Gatchell oil sand 8,103-87 ft.

Edison, Kern County: Monterey Expl. Co. 6 Brown, 14-30s-29e, pumped 48 bbl., 15.7-gravity, 2 per cent cut, T.D. 1,734 ft., P.B. 1,705 ft., 200-mesh perf. 1,625-1,705 ft., completed in lower Duff oil sand of Kern River series.

Greeley, Kern County: General Pet. 5 Oughton, 12-29s-25e, flowed 939 bbl., 38.2-gravity, 0.5 per cent cut, 496,000 cu. ft. gas, 18/64-in. bean, pressures 1,400/1,525 lb., T.D. 11,490 ft., perf. 11,318-11,489 ft., completed in Rio Bravo zone 11,334 ft. and Vedder zone 11,388-11,490 ft. of Miocene age.

Kern Front, Kern County: General Pet. 8 Young, 14-28s-27e, pumped 40 bbl., 14.6-gravity, 25 per cent cut, T.D. 2,086 ft., perf. 1,990-2,086 ft., completed in Tegeler zone of Kern River series.

Mount Poso, Kern County: Texas 2-8 Glide, 15-27s-28e, pumped 144 bbl., 16.2-gravity, 20 per cent cut, T.D. 1,710 ft., perf. 1,610-1,710 ft., completed in Vedder zone of Miocene age.

Mountain View, Kern County: Mohawk Pet. Co. 5 Clendennen, 30-30s-29e, pumped 75 bbl., 23.9-gravity, 5 per cent cut, T.D. 5,918 ft., P.B. 5,010 ft., perf. 4,830-80 ft., 4,955-70 ft., P.B. from Wharton zone of Miocene age to Hood zone of Lower Pliocene age.

Raisin City, Fresno County: Seaboard, Tide Water Associated, Union 1 joint test, 13-15s-17e, flowed 410 bbl., clean 24.1-gravity, 250,000 cu. ft. gas, 18/64-in. bean, T.D. 5,138 ft., completed in third Raisin City zone of Miocene age.

Ten Section, Kern County: Shell 44-29-A Kern County Land, 29-30s-26e, flowed 435 bbl., 35.7-gravity, 3 per cent cut, 198,000 cu. ft. gas, 15/64-in. bean, pressures 750/950 lb., T.D. 8,235 ft., perf. 8,000-8,231 ft., completed in Stevens sand of Miocene age.

Tupman, Kern County: Richfield 27-28-A Kern County Land, 28-30s-25e, flowed 1,240 bbl., 33.7-gravity, 1 per cent cut, 960,000 cu. ft. gas, two 96/64-in. beans, pressures 200/400 lb., T.D. 9,155 ft., perf. 8,865-9,150 ft., completed in Stevens oil sand of Miocene age.

SAN JOAQUIN VALLEY OUTPOSTS

Belridge, Kern County: Belridge Oil Co. 55-26 fee, 26-27s-20e, drilling and coring 10,830 ft. in hard sand, top Eocene 9,545 ft., now below Wagonwheel zone of Eocene age, elev. 658 ft.

Buena Vista Hills, Kern County: Honolulu 25-P fee, 10-32s-24e, T.D. 14,622 ft., P.B. 11,059 ft., perf. 4,650-4,850 ft., 5,300-5,400 ft., swabbing muddy water, elev. 916 ft.

Standard 91-11-D fee, 11-32s-24e, grading location.

Canal, Kern County: Shell 44-14-A Kern County Land, 14-30s-25e, drilling in oil sand and shale 10,480 ft., first Vedder zone test in field, 9⅝-in. casing cemented 9,680 ft., elev. 325 ft.

Elk Hills, Kern County: Standard 24-19-R fee, 19-30s-23e, drilling 3,550 ft. in shale.

Standard 62-31-S fee, 31-30s-24e, drilling 5,451 ft. in sand and shale, elev. 1,220 ft.

Standard 45-19-S fee, 19-30s-24e, drilling 10,990 ft. in sand and shale, elev. 707 ft.

Greeley, South, Kern County: A. N. Macrate 1 Haberfeld, 32-29s-26e, drilling 10,895 ft. in sand and very hard shale, top Stevens of Miocene age 8,090 ft., looking for Vedder, elev. 338 ft.

Kern Front, Kern County: Richfield 1 Kraemer, 34-28s-27e, drilling 5,791 ft. in sand.

Kettleman North Dome, Kings County: Standard 1-1-U fee, 1-23s-18e, T.D. 12,884 ft. in hard gray sand

showing considerable gas, redrilled 11,640 ft., tested wet, recemented, testing, elev. 693 ft.

Midway-Sunset, Kern County: North Amer. Oil Consd. 1-28-W.P., 28-32s-23e, drilling 9,920 ft. in sandy shale, elev. 1,650 ft.

Mountain View, Kern County: Hogan Pet. Co. 1-A Bahrenburg, 32-30s-29e, drilling 6,592 ft. in sand and shale, will be deep test.

Mount Poso, Kern County: Bishop, Bradford 1 Poso, 22-27s-28e, T.D. 1,434 ft. in oil sand and shale, will cement casing and test.

Paloma, Kern County: Western Gulf 12-7 Symons, 7-32s-27e, drilling 11,192 ft. in Pliocene sand, most easterly well in field, log shows 50 ft. oil sand 10,850 ft., elev. 288 ft.

Raisin City, Fresno County: Bandini Pet. 82-23 S.P., 23-15s-17e, drilling in sand 5,050 ft.

Shell 31-19 S.A.F.L., 19-15s-18e, rigging up rotary drilling equipment.

Rio Bravo, Kern County: Union 21-33 Pacific States, 33-28s-26e, T.D. 13,642 ft. in Eocene sand below Vedder zone of Miocene age, P.B. to Rio Bravo zone of Miocene age, elev. 330 ft.

SAN JOAQUIN VALLEY WILDCATS

Altamont district, Alameda County: Shell 1 Nissen, 7-2s-3e, drilling 5,930 ft. in hard sand, elev. 1,023 ft.

Belridge district, Kern County: Section 27 Oil Co. 1 Aslin, 27-28s-22e, T.D. 1,380 ft. in sand and silt, may abandon.

Chowchilla district, Madera County: Shell 74-9 Chowchilla farms, 9-11s-14w, T.D. 9,062 ft. in basement schist, P.B. 3,580 ft., will test.

Delano district, Kern County: Shell 52-21 Bell, 21-25s-28e, drilling 6,290 ft. in sand and shale, Miocene and Eocene barren, will abandon.

Helm district, Fresno County: Amerada 31-34 Clover, 34-26s-17e, T.D. 10,257 ft., P.B. 8,005 ft., one Eocene zone and two Miocene zones already found productive, building tanks and hooking up.

Kerman district, Fresno County: S. B. Herndon 1 Bottoms, 3-14s-16e, drilling in sand 5,571 ft., elev 187 ft.

McDonald anticline district, Kern County: Texas 1 Anderson, 19-28s-20e, drilling 5,270 ft. in sand and shale, elev. 1,080 ft.

Rio Vista district, Solano County: Standard 1 Bradford, 20-3n-3e, drilling 4,350 ft. in gas sand, P.B. 4,226 ft., perf. 4,160-4,223 ft., testing, elev. 5 ft.

Standard 1 Productive Properties, 23-3n-3e, drilling 5,370 ft. in sandy shale, elev. 5 ft.

Amerada 1 Robinson, 4-4n-2e, drilling 5,190 ft. in sand.

Riverdale district, Fresno County: Amerada 45-26 Lauton, 26-17s-19e, location.

Rumsey Hills district, Yolo County: Standard 1-1 Tippetts, 15-12n-3w, drilling in sand 2,640 ft., elev. 1,480 ft.

Shafter district, Kern County: General Pet. 51-15 S.P., 15-28s-24e, drilling 10,930 ft. in sand and shale.

Shale Hills district, Kern County: H. C. Morton 1 core hole, 30-26s-19e, T.D. 2,205 ft. in shale and oil sand, P.B. 1,000 ft., testing.

Tideland Oil Co. 1 Grant, 4-27s-18e, drilling 606 ft. in sand and shale.

Deepest Rincon Well

Ready for Production Test

Chanslor-Canfield Midway Oil Co. is preparing to make a production test on 3-C Hobson, a deep test in the Rincon field of Ventura County, and should be ready to turn the well to tanks within the next few days. This well is the deepest hole drilled in the Rincon field up to the present time and consequently operators are watching the outcome with keen interest. This deep test may establish the future development of the deep zone being justified or unwarranted. The first deep test of Chanslor-Canfield Midway Co. was 9-C Hobson located nearby but this well, bottomed at 9,300 ft., failed to show sufficient production to justify deep drilling. Lacking sufficient natural gas to result in a natural flow, 9-C Hobson is at present pumping 105 bbl. of 25-gravity oil cutting 2 per cent. When it came in last August this well showed an initial daily production of 133 bbl. of 25.5-gravity oil and 90,000 cu. ft. of gas.

The failure of this deep well to show large production in view of the fact that the hole was finished with a 4¾-in. liner carrying 484 ft. of perforations is attributed to the fact that the oil sand was very tight and lacked adequate porosity and permeability. The present well, 3-C Hobson, has cored over 1,500 ft. of oil sand but it too appears very hard and cannot be expected to show very large production. A string of 7-in. casing has been cemented in this well at 9,048 ft. and the company is just finishing scraping the formation. It is not the present intention to test out the entire zone at this time as there is one interval that shows more promise than the remainder of the hole.

Ventura-Newhall District

To Continue Active

The Ventura-Newhall district continues to attract numerous operators and this area is expected to continue relatively active during the remainder of the current year provided equipment is available. In the Del Valle field of Los Angeles County, Bankline Oil Co. experienced water trouble in 101 Videgain which was drilled to 7,700 ft. and then plugged back to 6,160 ft. This well was brought in flowing 200 bbl.

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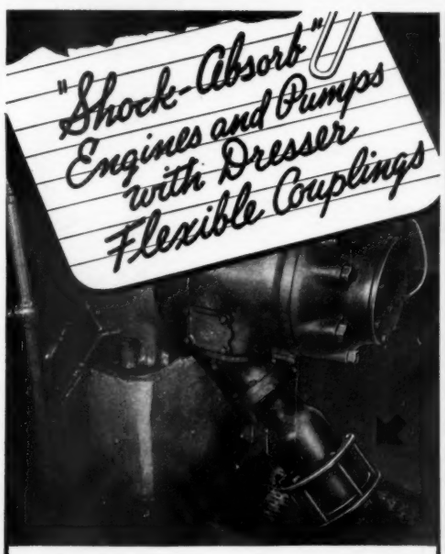

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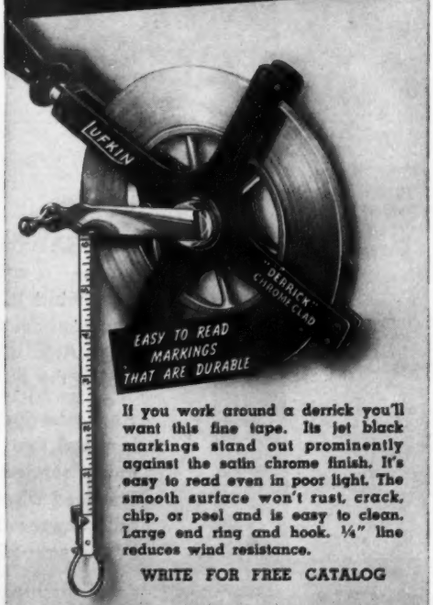

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daily but production showed a cut of 50 per cent water which tested 770 grains of salt per gallon. The contractor removed his equipment following completion and Bankline has moved in its own equipment and will attempt to exclude the water.

In the east end of the Del Valle field, R. E. Haven strite ran into a little delay in 1 Barnes but has since recovered. This well, while the crew was putting a plug on bottom where it was believed water was entering the hole, blew out between the 7-in. and 13⅜-in. through fittings and around the 7-in. at about 1,900 ft. This was reflected by the appearance of gas adjacent to the well and which later caused a crater in the side of the hill below the base of the derrick. The well blew gas, water and mud but no oil. The operator subsequently perforated the 7-in. casing at 1,900 ft. and effected a squeeze job to seal off that bypass. Operators have already started to bridge the gap in the Del Valle field between the Havenstrite discovery in the east end of the structure and the Videgain area to the west which are about 3,000 ft. apart. It is believed the two areas will join.

COASTAL DISTRICT WILDCATS

Padre Canyon, Ventura County: Continental 5 Hobson, 15-3n-24w, pumped 100 bbl., 26.7-gravity, 5 per cent cut, T.D. 6,237 ft., P.B. 6,090 ft., perf. 5,883-6,090 ft., 5,430-5,512 ft., 5,680-5,725 ft., completed in Hobson zone of Pliocene age.

COASTAL DISTRICT COMPLETION

Aliso Canyon district, Los Angeles County: Associated 1 Mission, 26-3n-16w, T.D. 5,550 ft. in gray sand, reaming, elev. 2,709 ft.

Shell 2 Mission, 25-3n-16w, location.

Castaic district, Los Angeles County: Texas 1 Fernando, 11-4s-17w, drilling 922 ft. in sand and shale, elev. 1,251 ft.

Cat Canyon district, Santa Barbara County: A. E. Bell 1 Gilmore, 23-9n-33w, T.D. 6,180 ft., 7-in. casing cemented 4,930 ft., deepening after swabbing 150 bbl. daily, would not flow.

Standard 3 Los Flores, 27-9n-33w, drilling in sand and sticky shale 5,590 ft., elev. 1,065 ft.

Union 12 Bell, 27-9n-33w, rig, is offset to Standard 2 Los Flores.

Camulos Ranch, Ventura County: Western Gulf 1 Rubel, 22-4n-18w, drilling in sand and shale 6,990 ft., elev. 750 ft.

Chatsworth district, Los Angeles County: Imperial Oil Co. 1 Chatsworth, 25-2n-17w, rig.

Del Valle district, Los Angeles County: Bankline Oil Co. 1 Videgain, 17-4n-17w, T.D. 7,700 ft. in shale and oil sand, top Miocene 5,856 ft., tested wet, elev. 1,719 ft.

Elwood district, Santa Barbara County: Barnsdall-Richfield 88-11 State, tideland, drilling 6,391 ft. in Sespe oil sand, completing, elev. 21 ft.

Loma Grande district, Monterey County: Loma Grande Oil Co. 1 Corey, 23-24s-10e, T.D. 3,790 ft. in shale, fishing drill collar and bit, elev. 1,500 ft.

Newhall district, Los Angeles County: Aztec Oil Co. 1 Sanborn, 6-3n-16w, T.D. 6,113 ft. in Miocene oil sand and sandy shale, swabbed dry, may deepen, elev. 1,516 ft.

R. W. Young 1 Walker, 11-4n-16w, drilling 5,294 ft. in hard gray sand and shale, had oil and gas shows on ditch, top Miocene 5,078 ft., elev. 1,254 ft.

Oak Canyon district, Los Angeles County: Western Gulf 1 Wickham, 31-5n-17w, drilling 5,730 ft. in sand, elev. 1,916 ft.

Hathaway 2 Ram, 31-5n-17w, drilling 6,898 ft. in sand and shale.

Rincon district, Ventura County: C. C. M. O. Co. 3-C Hobson, 17-3n-24w, T.D. 10,515 ft. in hard tight oil sand and shale, 7-in. casing cemented 9,048 ft., completing, elev. 245 ft.

Towsley Canyon district, Los Angeles County: Barnsdall and Ambassador Pet. 1 Limebocker, 17-3n-18w, drilling 3,497 ft. in hard sand and shale, elev. 1,680 ft.

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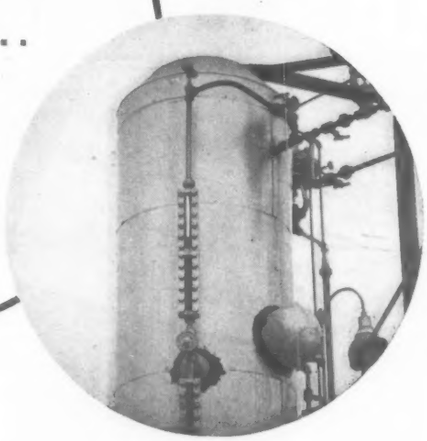

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California Earthquake Kills 10 Flowing Wells

Californians usually take their earthquakes in stride but every once in a while old mother earth shakes a little more than usual and breaks a few dishes in addition to cracking plaster walls. Earthquakes are common to California and it is only at infrequent intervals that severe damage is done or fatalities result. Most of the quakes result from slippage at some point along the San Andreas fault or some adjacent area and the earthquake is the relieving of stress at some point along the line. The major San Andreas fault runs southeastward from San Francisco to the southern California area and this line of faulting is quite visible from the air for many miles especially as it passes through the San Joaquin Valley and crosses the Ridge Route, a high elevation of mountains that separates Los Angeles and San Joaquin basins. The next most prominent line of shearing in southern California is the so-called Newport-Beverly shear zone that extends southeastward from Beverly Hills to Newport along the west side of Los Angeles Basin. Many of the earthquakes of local character originate in the relief of stresses along this line of folding.

Southern California areas were visited by an earthquake of moderate intensity on October 21 and another of minor consequence on October 22, 1941. These earthquakes probably reflect the relief of stress in the Newport-Beverly fault zone rather than in the San Andreas fault because the area effected was rather limited in extent. This is of special importance because the Dominguez field is located along the Newport-Beverly shear zone and during the earthquake of October 21 a total of 10 flowing wells were killed at Dominguez. Another well died in the Rosecrans field, another productive interval along this line of faulting, but it has not been determined whether this was due to the earthquake or from natural causes. All 10 wells in the Dominguez field were located in the extreme western end of the structure and the wells affected are located in an almost perfect circle. R. E. Havenstrite 1, 2, 3 and 4 on the Larronde lease died and six wells on Union's Callender lease adjoining died along about the same time and for the same reason.

It has not been determined whether the pipe was severed entirely or only collapsed or crushed. Because the wells were flowing, Union and Havenstrite were obliged to move in portable units and the first well should tell the story as soon as the crews get to work. All wells contained 2½-in. tubing and for this reason some difficult problems may be encountered especially if the casing has been severed or bent as this may mean the loss of the bottom of the hole and necessitate a redrill job. A crossfault is known to exist in the area in which the wells are located and operators knew at once what had happened. The slippage is believed to have occurred in and above the seventh Callender zone which is of Miocene age as there are several faults in the Miocene that are not present in the overlying Pliocene. Developments during the next week should determine whether the tubing can be pulled and whether the shearing action was of sufficient intensity to move the sheared casing out beyond the limits of the hole. It is logical to assume that the lower part of the water string is crushed and that this crushing will extend up the pipe for some distance.

There are a number of somewhat similar instances on record where California wells have been affected by earthquakes. A number of years ago Jack McKeon was drilling a well in the Santa Fe Springs field and had just brought it in flowing when an earthquake occurred. The oil was replaced with water by the earthquake and the well could never be put back on production. It was subsequently abandoned. The Bolsa Chica Oil Co. several years ago was drilling a well

(Continued on Page 193)

LOUISIANA GULF COAST

West Edge Well at Neale to Test Deep Wilcox Sand

By F. L. SINGLETON

NEW ORLEANS, La., Oct. 27.—On the west side of the Neale field, Beauregard Parish, Atlantic Refining Co. is making preparations to test the lower Wilcox as 5½-in. casing was being cemented in 3-B Rice Land & Lumber Co. which is bottomed at 11,210 ft. Although details are not available, the well is reported to have cored sands in the lower Wilcox about normal with the company's 5 Musser-Davis which opened this new sand several months ago at 10,880-96 ft. The Wilcox is said to have been topped at 8,308 ft., and the regular field pay in the upper Wilcox was logged about normal at 8,322-45 ft. The well is situated about 2,000 ft. southwest of the 8,300-ft. production and 4,000 ft. northwest of the deep sand producer. The successful completion of the well would prove the deep sand of blanket nature and mark the field as a major reserve. In the meantime, the outcome of the company's second well, 1 Hawkins unit, 2,000 ft. southeast, will be determined by the end of the week as it is drilling ahead in shale below 10,785 ft.

SUMMARY OF COMPLETIONS

	No.	Bbl.	Footage
Oil wells: Fields	11	3,081	90,988
Dry holes: Fields	4	.....	29,204
Wildcats	1	.....	8,897
Total	16	.....	129,089

Bayou Sale Outpost Preparing to Test

One mile south of the Bayou Sale field, St. Mary Parish, Atlantic Refining Co. was preparing to test 1 St. Mary Land Co. which may open a new sand for the structure as well as an important extension. Casing is being cemented below 11,000 ft. following an electrical survey. Broken sand showing oil has been cored at 10,317-50 ft., while sand showing gas and distillate was logged at 10,790-10,813 ft. Details as to what the electrical log showed below 11,000 ft. were not available. There are three producing wells on the structure all of which were drilled by Humble Oil & Refining Co., and completed in the discovery sand at approximately 10,100-50 ft. In addition to the Atlantic test, Humble Oil & Refining Co. has two active operations while ¾ mile west of production in Cote Blanche Bay, Texas Co. is drilling 1 State-Cote Blanche Bay.

To Drill Indian Village Prospect

Location for an 8,000-ft. wildcat was announced for the Indian Village prospect, southwestern Allen Parish, by A. J. Hafner, Jr. who secured a farmout from Stanolind Oil & Gas Co. The well is 1 Nevils in 10-7s-6w, about 1½ miles northeast of the town of Indian Village. The area has been worked extensively geophysically and the test is being supported by Humble Oil & Refining Co., Union Producing Co. and Crown Central Oil Co. Location for another deep test is reported to have been made in the Cut-Off area, La Fourche Parish, by Ernest Cockrell on the La Fourche Land Co. lease located in 32-18s-22e. Development in the area thus far has been confined to one or two shallow tests.

Humble Oil & Refining Co. is resuming exploration around the south flank of the Bayou des Glaize dome, Iberville Parish. The company is preparing to drill 1 E. B. Schwing which is located closer to the dome, being located ¼ mile from 1-B Schwing, recently abandoned. Two wells drilled by the company on the northeast flank showed for producers, but both were later abandoned. Another flank test which is attracting attention is Superior 1 Dibert-Stark and Brown, located on the northwest flank of the Chacahoula dome, La Fourche Parish. The well is drilling below 12,600 ft. and no shows have been reported. Production around this structure has been established on the south, southwest, southeast and northeast flanks.

Erath Defined on Southeast

The Erath field, Vermilion Parish, was defined to the southeast as Texas 1-B Henry was abandoned at a total depth of 12,005 ft. The well is several thousand feet from production in 30-13s-4e. In the meantime, the company continues to test 1 R. H. Henry which last week opened gas-distillate from a new sand when the well flowed 369 bbl. of distillate on a 10/64-in. choke while testing at 8,500-20 ft. Total depth of the well is 11,599 ft., and the company is testing additional sands that were logged by electrical surveys.

On the east flank of the Pine Prairie dome, Evangeline Parish, Gulf 1 Easton Townsite is bottomed at 8,140 ft., and the company is testing the regular pay at 8,120-30 ft. The completion will extend production a few hundred feet west, closer into the dome. On the west flank Texas Co. has reached an interesting depth on its operations, the first to be drilled on this side of the structure.

In East Baton Rouge Parish, Texas Progress Oil Co. has let contract for 1 Nelson, a wildcat located in 74-8s-1e, about 1 mile north of Cockburn Oil Corp. 1 Nelson, drilled in the area several months ago and which is reported to have logged interesting showings.

Union Sulphur 1 Arcenaux, reported the previous week as opening production from a new sand on the south flank of the Welsh dome, Jefferson Davis Parish, is reported to be flowing at the estimated rate of 200 to 250 bbl. daily while testing through a 10/64-in. choke. This well was drilled to a total depth of 7,509 ft., and is testing through perforated casing at 7,432-40 ft. which is believed to be the Frio sand.

LOUISIANA GULF COAST COMPLETIONS

Wildcats

Assumption Parish: George Echols 1 Armelise Planting Co., dry, T.D. 8,897 ft.
Terrebonne Parish: Barnsdall 3 Nelson, 24 bbl. dis-

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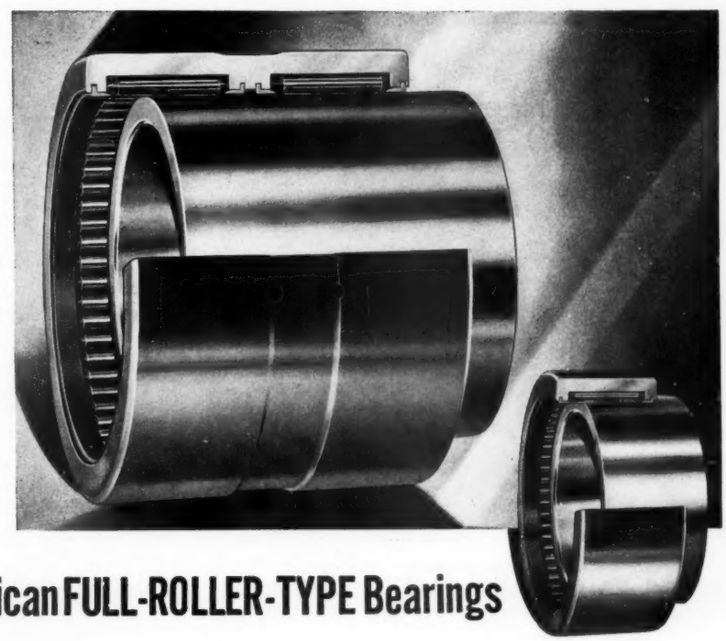

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tillate, 2,500,000 cu. ft. gas, ¼-in. choke, perf. casing 6,750-55 ft., T.D. 10,205 ft.

Fields

Anse La Butte, St. Martin Parish: Iberia 6-A Moresi, 150 bbl., 7/32-in. choke, T.D. 3,076 ft., P.B. T.D. 2,950 ft.

Bayou Choctaw, Iberville Parish: Carter 10 Gray, 135 bbl., ¼-in. choke, perf. casing 6.902-08 ft., T.D. 7,505 ft.

East Hackberry, Cameron Parish: Texas 32 State, dry, T.D. 10,123 ft.

Union Sulphur 11 Doiron, 178 bbl., 12/64-in. choke, perf. casing 7,230-40 ft., T.D. 7,457 ft.

Edgerly, Calcasieu Parish: Emerson 2 Stanolind, dry, T.D. 3,763 ft.

Erath, Vermilion Parish: Texas 1 R. H. Henry, 369 bbl., 10/64-in. choke, perf. casing 8,500-20 ft., T.D. 11,599 ft.

Leeville, La Fourche Parish: Texas 84 L. L. & E. Leeville, 776 bbl., 7/32-in. choke, perf. casing 8,970-9,006 ft., T.D. 9,014 ft.

North Crowley, Acadia Parish: Humble 8 Reiners, 129 bbl., 7/32-in. choke, perf. casing 8,781-85 ft., T.D. 8,987 ft.

Port Barre, St. Landry Parish: Grubb & Hawkins 1 Cormier, dry, T.D. 6,038 ft.

Paradis, St. Charles Parish: Texas 14 L. L. & E. Paradis, 486 bbl., 7/32-in. choke, perf. casing 10,090-10,132 ft., T.D. 10,352 ft.

Stella, Plaquemines Parish: California 111-B Delta Minerals, 153 bbl., ½-in. choke, T.D. 7,643 ft., P.B. T.D. 7,070 ft.

St. Gabriel, Iberville Parish: George Echols 3-B Gueymard, 194 bbl., 8/64-in. choke, T.D. 7,810 ft., P.B. T.D. 7,783 ft.

South Crowley, Acadia Parish: Humble 1 Freeland, dry, T.D. 9,280 ft.

West Bay, Plaquemines Parish: Gulf 5-E Buras Levee district, 487 bbl., 7/32-in. choke, perf. casing 7,323-25 ft., T.D. 7,340 ft.

LOUISIANA GULF COAST DRILLING REPORT

Allen Parish: J. A. Hafner, Jr. 1 Nevils, 10-7s-6w, first report.

Acadia Parish: Stanolind 1 Tweedel, 77-7s-3e, drilling shale 5,830 ft.

Calcasieu Parish: Union Oil Co. of California 1 Gray, 4-11s-9w, R.U.

Cameron Parish: Superior 1 Paggi, Lakeside field, drilling sandy shale 8,073 ft.

Iberia Parish: Gulf 2 Petit Anse Co., Avery Island dome, 25-13s-5e, drilling shale 9,532 ft.

La Fourche Parish: Texas 1-A La Fourche Basin Levee district, 32-19s-24e, drilling sand 9,712 ft.

Plaquemines Parish: Texas 1 Delta Duck Club, 32-20s-20e, drilling sand 10,166 ft.

Papides Parish M. H. Marr et al 1 Eota Realty Co, 14-4n-3e, top Wilcox approximate 4,017 ft., T.D. 5,135 ft., running survey.

St. Mary Parish: Texas 1 State Cote Blanche, Township 15s-7e, drilling sandy shale 7,744 ft.

St. Martin Parish: Amerada 1 St. Martin Land Co., 19-9s-8e, drilling sandy shale 6,475 ft.

West Central Texas Fields

(Continued from Page 177)

WEST CENTRAL TEXAS COMPLETIONS

Wildcats

Callahan County: Ungren & Frazier 1 R. McDonald, Sec. 113, B.B.B.&C. Sur., dry at 1,117 ft.

F. E. McCreedy 2 N. M. George, Sec. 72, B.O.A. Sur., dry at 850 ft.

A. H. Odell 1 J. A. Barr, 450 ft. from N and 1,400 ft. from E lines, Cherry Sur. 332, dry at 375 ft.

Comanche County: Rudolph Grossenbeck 1 Mary G. Polk, 450 ft. from S and W lines, Lot 10, Comanche C.S.L. Sur. 42, Abst. 124, dry at 810 ft.

Jones County (semiwildcat): Falls Ref. Co. 2 F. C. Spurrier, Lot 1, W. C. Walker Sur. 6, dry at 2,354 ft.

Taylor County: Hedrick Oil Co., Ltd., 1 H. R. Arrant, Sec. 53, T.&P. Sur., Blk. 16, dry at 2,505 ft.

Deep Oil Dev. Co. 1 J. E. Higgins, Lot 8, D. B. Corley Sur. 8, dry at 2,393 ft.

Fields

Breckenridge, Stephens County: Helmerich & Payne, Inc. et al 1 Laura Smith, Sec. 1405, T.E.&L. Sur., dry at 3,279 ft., top Caddo 3,221 ft.

Brownwood, Brown County: Hightower Oil & Ref. Co. 3-B Buckner's Orphan Home, William Iron Sur., 25 bbl. oil and 1,500,000 cu. ft. gas in 24 hr., 4,000 gal. acid 1,440-1,524 ft., T.D. 1,524 ft.

Central Texas Gas Co. 2 Buckner's Orphan Home, William Iron Sur., 15,000,000 cu. ft. gas in 24 hr., gas lime 1,571-82 ft., 4,000 gal. acid 1,573-82 ft., T.D. 1,582 ft.

Novice, Coleman County: States Oil Corp. 1 J. M. Barnett B, Sec. 21, T.&N.O. Sur., Blk. 2, 220 bbl. in 24 hr., pay 3,503-22 ft., T.D. 3,539 ft.

Shackelford, Shackelford County: R. H. Roark et al 11 J. H. Elliott, Sec. 12, L.A.L. Sur., dry at 983 ft.

Wimberly, Jones County: Merry Bros. & Perini et al 1 A. M. Wimberly, Lot 106, Godwin subd., O.S.L. Sur. 126, 103 bbl. in 6 hr., est. 300 bbl., pay 2,217-32 ft., T.D. 2,232 ft.

J. L. Collins & Co. 2 O. J. Fikes, Lot 105, Godwin subd., O.S.L. Sur. 126, 163 bbl. in 9 hr., est. 400 bbl., pay 2,337-42 ft., T.D. 2,345 ft.

WEST CENTRAL TEXAS ACTIVE WILDCATS

Brown County: H. P. Evans 1 Starkley, SE SE Sec. 3, H. C. Walker Sur., S.D. 1,240 ft.

R. H. Herring 1 Martin, 150 ft. from S and W lines. NE NE Sec. 44, H.T.&B. Sur., 1,600-ft. cable-tool test, running casing 1,345 ft.

Mrs. L. C. Ort 1 McGhee, 330 ft. from N and E lines, SE Sec. 49, H.T.&B. Sur., 2,500-ft. cable-tool test, drilling 2,446 ft.

A. O. Turner 1 White, 1,320 ft. from N and 330 ft. from W lines of E. Ferguson Sur. 110, 1,000-ft. cable-tool test, S.D. 425 ft.

Callahan County: William Austin 1-A I. N. Jackson, 1,980 ft. from N and E lines, Sec. 20, E.T. Sur., 1,200-ft. cable-tool test, fishing for tools 700 ft.

Rhodes Drilling Co. 1 R. H. Seale, 2,310 ft. from S and W lines, Lewis Johnson Sur. 252, 1,250-ft. cable-tool test, first report.

Ungren & Frazier 2 Ethel Burks, 600 ft. from S and W lines, Sec. 116, B.B.B.&C. Sur., 1,300-ft. cable-tool test, first report.

Coleman County: Anderson & Prichard 1 Bettie J. Mathews, 467 ft. from N and W lines, Lot 2, H. Kegan Sur. 520, first report.

A. P. Hienze 1 Whittington, NW SE Sec. 4, Blk. 2, T.&N.O. Sur., 3,800-ft. test, drilling 1,003 ft.

Merry Bros. & Perini 1 Greer, 1,283 ft. from S and 467 ft. from W lines, Lot 2, H. Kegan Sur. 520, 4,000-ft. rotary test, flowed 160 bbl. oil in 11 hr., est. gas-oil ratio 10,000 cu. ft., testing 3,937 ft.

States Oil Corp. 1 T. J. Hudson, 467 ft. from S and W lines, Sec. 74, G.H.&H. Sur., Blk. 2, 3,600-ft. test, drilling 1,501 ft.

States Oil Corp. 1 Hughes, 2,465 ft. from S and 2,335 ft. from W lines, Sec. 34, Blk. 2, G.H.&H. Sur., 3,600-ft. test, P.B. 3,340 ft., 40-qt. shot 3,310-35 ft., tested est. 70 M.c.f. gas, S.D., T.D. 3,566 ft.

West Coast Prod. Corp. 1 Norris, SW cor. of NE 160 acres, J. Greenwood Sur. 304, treated with 3,000 gal. acid through perf. at 2,600-30 ft., cleaning out est. 10 bbl. oil and 10 bbl. water daily, T.D. 3,263 ft.

Concho County: Floyd C. Dodson 1 Robert Wilson, Thomas Green Sur., 10 mi. SW of Eden, perf. casing 3,730-32 ft., to recement, cleaning out 4,102 ft.

W. J. Rutledge 1 Will Loveless, 500 ft. from S and W lines, Sec. 2, Anderson Sur., Abst. 1773, 5,000-ft. cable-tool test, waiting on rig, T.D. 68 ft.

Eastland County: R. H. Gaddy 1 Vestal, 330 ft. from S and 1,755 ft. from W lines, Samuel Damon Sur., 2,800 ft. rotary test, treated with 1,000 gal. acid, no results, S.D. for orders 2,653 ft.

Stewart Oil 1 Shaeffer, 660 ft. from E and 1,980 ft. from S lines of 394-ac. farm in Moses Allen Sur. 26, 3,500-ft. test, cleaning out 1,800 ft. after underreaming from 1,665 ft.

E. M. Thomason 1 Busbee, 1,320 ft. from N and 330 ft. from E lines, Sec. 7, Blk. 2, E.T. Sur., 900-ft. cable-tool test, S.D. 402 ft.

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25 years of successful experience stand behind Le Roi engines. That's why they are ruggedly designed, to stand up under severe conditions — built from extra-fine materials including costly alloys — machined to exceptional precision — *completely* equipped — and thoroughly inspected and tested — so they come through in the pinches, and justify your good judgment in insisting on Le Roi.

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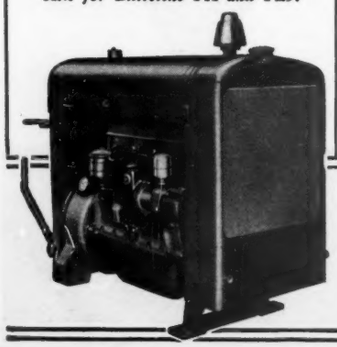

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Western Machinery Company
St. Louis, Missouri • Salem, Illinois

Fisher County: P. R. Long 1 Maberry, SE cor. A. A. Soring Sur., 2 mi. SW of McCaully, S.D. for orders 3,289 ft.

Shell Oil 1 Vaughn, 467 ft. from N and 1,787 ft. from W lines, Sec. 205, Blk. 21-V, H.&T.C. Sur., 7,250-ft. test, coring 6,800 ft.

Hamilton County: Grady Wallace 1 J. H. Robertson, 4,750 ft. from NE and 6,400 ft. from SE lines, J. Chew Sur., Pat. B-1635, Abst. 164, 4,000-ft. cable-tool test, drilling 479 ft.

Haskell County: J. A. Worsham 1 McLennan, 440 ft. from S and W lines of 370-ac. farm, S. C. Robertson Sur. 4, A-352, 3,500-ft. rotary test, drilling 113 ft.

Edward C. Lawson 1 C. C. Rose, 489 ft. from S and 440 ft. from E lines of 392-ac. tract, J. McCass Sur. 57, Abst. 95, 3,000-ft. test, drilling 735 ft.

Jones County: T. J. Coyne 1 L. E. Clyburn, NW cor. tract in Lots 24 and 27, Holt subd., Henry Millard Sur., 2,000-ft. test, S.D. for orders 2,378 ft.

J. B. Cunningham et al 1 J. B. Freeman, 330 ft. from W and 2,000 ft. from S line, Alex Glenn Sur., 2,800-ft. cable-tool test, first report.

Roeser & Pendleton 1 Moore, 242 ft. from N and 330 ft. from E lines of 40-ac. farm in E part Sec. 33, Blk. 15, T.&P. Sur., 2,300-ft. cable-tool test, drilling 2,001 ft.

W. L. Snoddy 1 Huddleston, 2,150 ft. from S and 467 ft. from W lines of farm in E part of Sec. 41, Blk. 18, T.&P. Sur., 3,000-ft. rotary test, drilling 1,930 ft.

Ungren & Frazier 1 S. J. Peyton, 330 ft. from S and 1,070 ft. from E lines of 100-ac. tract, Stephen M. Hale Sur. 251, 1,195-ft. test, drilling 905 ft.

Palo Pinto County: Hickok & Reynolds 3 Gauldin, 467 ft. from S and E lines, Sec. 1756, T.E.&L. Sur., 4,250-ft. cable-tool test, drilling 4,386 ft.

E. Lloyd 1 C. A. Dalton, 560 ft. from S and 1,165 ft. from E lines of W. Lewis Sur. 83, Abst. 299, 1,500-ft. test, drilling 325 ft.

Shackelford County: C. J. Kleiner et al 1 Dawson & Conway, 975 ft. from S and 330 ft. from E lines of Luke Byron Sur. 24, 1,700-ft. test, drilling 1,415 ft.

L. L. Rector 1 Grimes, 150 ft. from S and W lines, NW Sec. 75, Blk. 12, T.&P. Sur., drilling 1,088 ft.

R. H. Roark 1-B Elliott, 660 ft. from S and E lines, SW Sec. 9, L.A.L. Sur., 5,000-ft. cable-tool test, repairing rig, 2,890 ft.

Jones & Stasney et al 1 T. W. Gresham, 660 ft. from N and W lines of SE Sec. 7, B.A.L. Sur., 4,000-ft. test, pits dug.

Stephens County: Daniel & Pardue 1 W. A. Corbett, 440 ft. from S and 940 ft. from W lines of 240-ac. lease, Sec. 11, S.P. Sur., 3,350-ft. rotary test, drilling 2,835 ft.

T. S. Schroeder 1 Corbett, 2,200 ft. from E and 444 ft. from N lines, Sec. 12, Blk. 3, S.P. Sur., preparing to P.B. from 4,721 ft., T.D.

T. G. Shaw, Tr., 1 E. Whalen estate, 467 ft. from N and W lines, Sec. 1089, T.E.&L. Sur., Abst. 370, 4,200-ft. rotary test, drilling 1,725 ft.

Christie Bros. 1 H. M. McDonnell (was Cox & Caprite 1 Donnell), 2,900 ft. from N and 400 ft. from E lines, Sec. 1208, T.E.&L. Sur., old well to be drilled deeper, old T.D. 3,270 ft., making est. 30 bbl. of distillate per day, fishing for bailer at T.D. 3,894 ft.

Taylor County: Butler & Horne Drlg. Co. 1 Merchant, 330 ft. from N and 2,687 ft. from W lines, S½ Sec. 30, Blk. 16, T.&P. Sur., 2,800-ft. cable-tool test, drilling 425 ft.

Deep Oil Dev. Co. 1-A J. E. Higgins, 330 ft. from N and 360 ft. from E lines, Lot 8, C. B. Corley Sur., 2,850-ft. cable-tool test, drilling 2,400 ft.

Ungren & Frazier 1 Trinity University, 330 ft. from S and W lines of E 32.7-ac. tract, Lot 2, Grimes C.S.L. Sur. 148, 2,900-ft. cable-tool test, drilling 2,740 ft.

NORTH TEXAS ACTIVE WILDCATS

Archer County: Phillips 1 Reilley "Pendery," SW NW Sec. 13, Blk. 4, H.&T.C. Sur., 5,600-ft. test, top Caddo 4,908 ft., drilling 5,105 ft.

Sunray Oil Co. 1 Seibold, 560 ft. from E and 330 ft. from S lines, L. P. Jones Sur. A-939, Ellenburger test, drilling 4,290 ft.

Dr. K. Van Allen 1 E. C. Kelley, NE NE NE Sec. 68, Harris subd., Club Ranch, 5,000-ft. rotary test, drilling 2,220 ft.

Baylor County: T. F. Hunter 1 Robertson C.S.L. Sur., 4,590 ft. from N and 460 ft. from E lines, Robertson C.S.L. Sur. A-280, 3,500-ft. test, drilling 2,721 ft.

Clay County: Bridwell Oil 1 Myers (old well drilling deeper), Charleston Thompson Sur. A-444, old T.D. 6,065 ft., 2,000 gal. acid, no results, drilling 6,065 ft.

N. H. Martin & Sons 1 C. W. McClellan, 173 ft. from SW and 150 ft. from SE lines, Lot 22, Knott subd., 1,500-ft. test, location, first report.

Shell 1 J. W. Maddox A, 2,272 ft. from N and 2,114 ft. from W lines, Hughes Sur. A-179, 5,600 ft. test, drilling 3,442 ft.

Sinclair Prairie 1 Scheer, 1,124 ft. from E and 330 ft. from S lines, Sec. 47, Orange C.S.L. Sur. A-368, drilling 6,459 ft.

Cooke County: James Anderson 1 Orsburn, 491 ft. from N and 330 ft. from E lines, B. Sullivan Sur. A-581, 2,500-ft. test, drilling 2,320 ft.

Humble 1 J. Felderhoff, Sec. 24, George Ivy Sur. A-516, location, first report.

Kimbell & Bohner 1 Phillips and Herman, 713 ft. from W and 860 ft. from S lines, J. Collingsworth Sur. A-211, S.D. 2,525 ft.

J. G. Richards & Sons 2 J. Felderhoff, 800 ft. from E and 1,600 ft. from S lines, Lot 18, Subd. 24, George Ivy Sur. A-516, 750-ft. cable-tool test, location, first report.

W. F. Russell 1 C. F. Bandy, 170 ft. from N and 460 ft. from W lines, P. P. Cady Sur., 1,250-ft. rotary test, location, first report.

Thornton & McKee 1 Berryman, 450 ft. from N and 400 ft. from W lines, Sec. 22, Barnett Sur., 1,500-ft. test, drilling 675 ft.

Denton County: Hunt Oil 1 Jones, 4,300 ft. from S and 671 ft. from E lines, J. Thomas Sur. A-1239, Ellenburger test, rigging up rotary.

Foard County: Bruce Sullivan 1 McCoy, 467 ft. from N and W lines of farm in J. M. Seaton Sur., 6,000-ft. test, drilling 1,324 ft.

Grayson County: Brown & Laves 1 Stephenson, 467 ft. from most northerly N and 467 ft. from W lines, N. L. Stephenson 92-ac. tract in E central part of Charles Quillen Sur. A-989, 4,100-ft. test, drilling 3,702 ft.

Jack County: Alma Oil 1 Maxey, V. W. Maxey Sur., S.D. 5,633 ft., repairs.

Magnolia 1 Borden, 1,000 ft. from N and 500 ft. from W lines, W. R. Smith Sur. A-547, Ellenburger test, fishing drill collar 6,022 ft.

Parker & Farns 1 Lewis, 467 ft. from S and W lines E 80 acres, Blk. 2, Navarro C.S.L. Sur., location, first report.

Taubert & McKee 1 M. Hoefle, A. James Sur. A-318, drilling plug to test, T.D. 4,835 ft.

Montague County: Benson Bros. 1 Riley, 467 ft. from S and midway between E and W lines of farm in C. Ellis Sur. A-1146, 7,500-ft. test, drilling 6,157 ft.

J. A. Chapman 1 Fowler, 330 ft. from S and E lines, J. W. Massie Sur. A-463, testing 4,937 ft.

Continental 1 Winder, 467 ft. from N and E lines, S 40 of W 80 of N½ Sec. 4, Limestone C.S.L. Sur., 7,200-ft. test, drilling 6,170 ft.

Walter Gant 1 John Turner, 330 ft. from N and E lines, Sec. 59, E.T. Sur., flowed 80 bbl. in 2 hr., ½-in. choke, after S.I. for week.

Youngblood, Foree & Stogner 1 C. D. Meador, 467 ft. from SE and SW lines, J. B. Miller Sur. A-461, 6,000-ft. test, rigging up rotary.

Throckmorton County: Nash & Windfohr 1 Parrott, SW SW Sec. 957, T.E.&L. Sur., 4,500-ft. test, set 7-in. casing at 4,000 ft., drilled plug, swabbing 4,022 ft.

A. L. Wasson 1 Erwin, 4,250 ft. from W and 2,000 ft. from S lines, S. Holder Sur. A-212, S.D. 740 ft.

Wichita County: Kemrow Prod. 57 Barnett, Sec. 6, H.&T.C. Sur. A-428, 3,650-ft. test, perf. casing 1,898-1,905 ft., 1,000 gal. acid, pumped 9 bbl. oil and 9 bbl. water in 2 hr.; T.D. 3,731 ft.

Paul H. Sisk 2 L. A. Sisk, 450 ft. from N and W lines, Lot 15, Lge. 2, Denton C.S.L. Sur., location.

Young County: Kerlyn Oil and Phillips 1 Garvey, 947 ft. from N and 2,353 ft. from E lines, Sec. 4, O.B.&N. Sur. A-19, 5,700-ft. test, drilling 2,405 ft.

Panhandle Ref. 1 Harrell, 467 ft. from S and E lines, G. N. Smith Sur. A-254, 3,700-ft. test, cored 3,560-70 ft., rigging up spudder.

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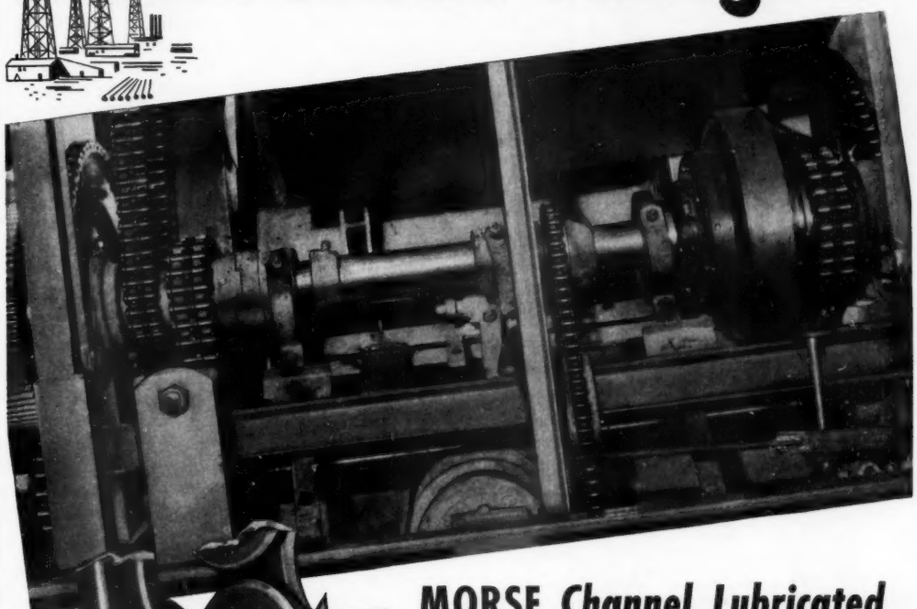

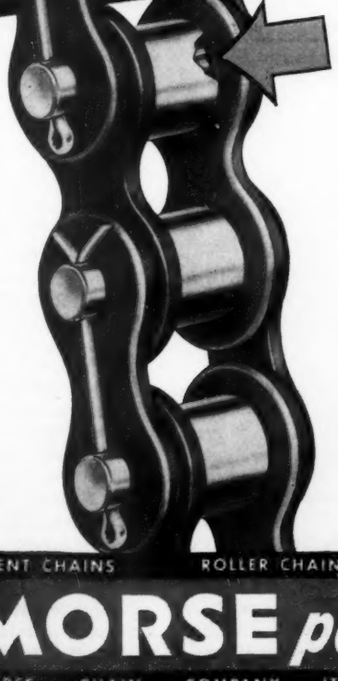

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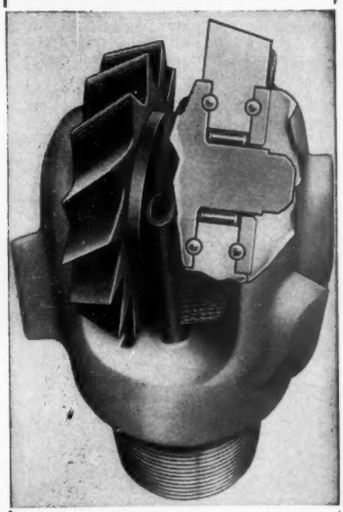

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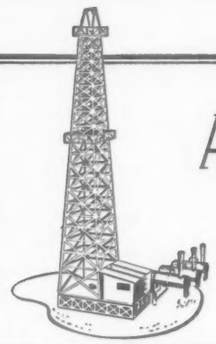


Among the Drilling

Association Will Hold First Annual Meeting, November 12-14

THE FIRST annual meeting of the American Association of Oil Well Drilling Contractors will be held in Dallas, Tex., on November 12, 13 and 14, according to an announcement by J. E. Brantly, Drilling & Exploration Co., who is president of the organization. The group was formed a little more than a year ago with the constitution and bylaws being adopted at a session during the A.P.I. meeting in Chicago.

Regional chairman making arrangements for the meeting are Warren S. Churchill, Arrow Drilling Co., and Glenn Campbell, Campbell Drilling Co., Tulsa; Leslie Fain, Fain-Porter Drilling Co., Oklahoma City; A. S. Ritchie, McPherson Drilling Co., Wichita, Kans.; J. I. Roberts, J. I. Roberts Drilling Co., N. H. Wheless, Sultan Drilling Co., and A. A. Stacy, all of Shreveport, La.; Harry L. Edwards, Harry L. Edwards Drilling Co., and Jack Frazier, of Houston, Tex.; E. B. Rubsamen, Jr., Trinity Drillers, Inc., San Antonio, Tex.; C. J. Davidson, Davidson Drilling Co., Fort Worth, Tex.; C. J. Paine, F. B. Paine Drilling Co., and M. J. Delaney, both of Dallas, Tex.; J. P. Morgan, Morgan Brothers, Inc., Wichita Falls, Tex.; Will I. Lewis and Walter G. Tschudin, Illinois area; George P. Livermore, Lubbock, Tex.; Dorsey Straitiff, Rocky Mountain Drilling Co., and Walter Buaas, Taft Drilling Co., California area, and Joseph Zeppa, Delta Drilling Co., East Texas area.

GEORGE ECHOLS, Houston, Tex., is preparing to move a rotary to the new Magnolia field, Montgomery County, Texas, for his 1 George Nees, located south of the discovery well in the B.B.B.&C. Survey. In the meantime drilling continues with two rigs in the St. Gabriel field, Iberville Parish, Louisiana.

T. G. MARKLEY received contract from the Texas Progress Oil Co. for 1 Nelson, a wildcat located in 74-8s-1e, East Baton Rouge Parish, in coastal Louisiana.

CARTER & RUBSAMEN, San Antonio, Tex., are moving a rotary to the Carolina-Texas gas field, Webb County, Texas, preparatory to deepening Continental 13 Houston Oil Co. This well will be drilled from a depth of approximately 5,000 ft. to the Wilcox formation which is expected to be encountered around 9,000 ft.

OWNBY Drilling Co. is drilling below 2,040 ft. in lime at 1 Morrison, Section 34, in the T.&P. Survey, north of Westbrook in Mitchell County, Texas. The wildcat is scheduled for a 3,100-ft. test.

MAC Drilling Co., Houston, Tex., has apparently established a new Wilcox sand field for the upper Texas Gulf Coast with the drilling of Stanolind 1 J. F. Parker, a wildcat located in the Fred area, Tyler County. The well is drilling below 8,400 ft. after a 32-minute drill-stem test at 8,184-8,201 ft. recovered 10 thribbles of pipe-line oil and tested 85 lb. working pressure. Another rotary is running for the same company in the Lucky area, Matagorda County, while two rigs are located in the West Ganado field, Jackson County, for the Pure Oil Co.

ALLISON Drilling Co., Shreveport, La., is going below 6,382 ft. in seeking Trinity production in the Shreveport field of Caddo Parish, Louisiana. The deep operation is 11 Ellerbe, Section 27-18-14, and is expected to top the lower Marine Trinity series about 8,200 ft.

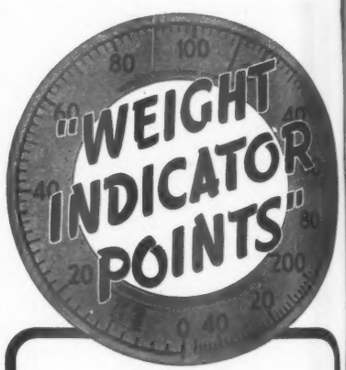
SUPERIOR Drilling Co., Houston, Tex., completed two additional producers in the northwest-extension area of the Withers field, Wharton County, Texas, for F. W. Michaux, and both rigs are being moved to new locations.

McDONALD & McDONALD, South Arkansas drilling contracting firm, has been given contract for a new 4,000-ft. wildcat test in Ouachita County, South Arkansas. It is 6 miles northeast of Stephens and will be for E. L. Foster and associates. The location is in SW SW Section 4-15-18.

WYNN CROSBY Drilling Co., Houston, Tex., has reached an interesting depth on H. A. Porter 1 L. A. McDonald, a wildcat located in the W. D. C. Hall Survey, Brazoria County, Texas. In the meantime the company's 1 Poole, a wildcat located in the Lissie area, Wharton County, Texas, is drilling below 9,400 ft.

THOMAS Drilling Co., Houston, Tex., has been organized by B. W. Trull, Palacios, Tex.; M. Thompson, Houston, and Violet M. Brhlik, Midfield, Tex.

GIBSON Drilling Co. is rigging up standard tools for a wildcat test 6 miles southwest of Colorado City.



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Contractors

Mitchell County, Texas. It will be 1 C. C. Thompson, 933 ft. from the north and 467 ft. from the west lines of Section 71, Block 21, T.&P. Survey.

AMERICAN Drilling Co. reportedly has topped the solid lime at 4,520 ft. at a wildcat test in northwestern Terry County, Texas. The wildcat is the firm's 1 Hufnall and is located in Section 14, Block D-14, C.&M. Survey. With an elevation of 3,528 ft., 1 Hufnall is flat structurally with Texas 1 Murphy, wildcat failure 4½ miles southwest, which had several promising oil shows.

UNGREN & FRAZIER, drilling contractors, are drilling below 460 ft. at 1 R. McDonald in Callahan County, Texas. Location of the wildcat test is 220 ft. from the south and east lines of a 150-acre tract in Section 213, B.B.B.&C. Survey. No. 1 McDonald is being drilled with cable tools to contract depth of 1,300 ft.

DELTA Drilling Co., Tyler, Tex., is building derrick for a joint operation with Robert A. Stacy in the Dorcheat field of Columbia County, South Arkansas. It is to be 1 Hunt, C SE SW 11-18-22, and is in the northwest part of the 17-well oil and gas-producing field.

NEIL J. BERSTON, Saginaw, Mich., contractor, has moved a cable-tool outfit to location for W. P. Boles 1 Bacon-Swan, C SW NW 2-10n-5w, Broomfield Township, Isabella County, Michigan.

R. G. (Tex) PATTILLO, Monahans, Tex., has received contract to drill through the Cretaceous with cable tools at Skelly Oil Co.'s new wildcat test in Terrell County, Texas, 16 miles northeast of Sanderson. Rotary tools will supplant cable equipment for lower part of the hole, which is scheduled to 7,000 ft.

EUGENE HILLIARD, Mount Pleasant, Mich., has contracted to drill Ohio Oil Co. 2 State, C N½ NW SE, 34-21n-1w, Roscommon County, Michigan, on acreage held jointly by the contractor and operating company.

C. W. TEATER, Mount Pleasant, Mich., has received contract to drill Grale Oil Co. 4 Henry C. Baderschneider, C N½ SW NW 9-21n-1w, Roscommon County, Michigan.

COLUMBIA OIL & GAS CO. has taken contract to drill Leonard Pipe Pine Co. 1 Smeed, C SW SW 2-10n-5w, Montcalm County, Michigan, and is moving in cable tools.

GLENN McCOUN, Allegan, Mich., has received contract for N. R. Dodd 1 Stadler, SW SW SE 1-1s-14w, Van Buren County, Michigan.

M. D. WELLS, Mount Pleasant, Mich., is moving tools to R. D. Malcolm 1 J. A. Dvorak, NW NW NE, 12-1s-14w, Bloomingdale Township, Van Buren County, Michigan.

Ruling to Force Capitalization Of Contract Outlay Is Tentative

DISALLOWANCE OF THE deduction of the amount paid for contract-drilling costs where the work was done by contract and forcing of the oil companies to capitalize these charges when computing income-tax returns is still tentative. So far, this is not a ruling by the Internal Revenue Department and nothing has been published on the question. The disallowance of the option of charging to capital or to expense is contained so far in an interoffice memorandum. However, it appears that this is the method which the Internal Revenue Department will try to put in force for the present year. In the past, "turn key" contracts have been disallowed, but not the straight drilling contract that calls for the drilling of so many feet. Under the new ruling, only labor, fuel, teaming, trucking, etc., when paid by the taxpayer, actually and directly, would be excepted.

So far there have been no cases come up which question the ruling. Companies affected by it can protest the measure in conferences with the revenue agents, then through a meeting with the revenue technical board in each division, then before the Board of Tax Appeals and finally in federal District Court.

Section 19.23 (m)—16(a) (1) of the regulations states: "Drilling and development costs shall not be excepted from the option (to charge to capital or expense) merely because they are incurred under a contract providing for the drilling of a well to an agreed depth, or depths, at an agreed price per foot or other unit of measurement."

If the present theory is sustained, then the declared value may be inadequate to take care of the increased taxable income resulting from the disallowance of drilling contracts as expense, and thereby increasing the declared value excess profits tax as well as the normal tax. Drilling contracts under this theory would be capitalized and written off as part of cost depletion.

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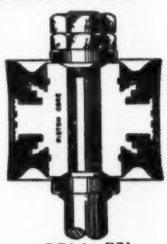

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Two Wilcox Discoveries Are Showing in Tyler County

By NEIL WILLIAMS

HOUSTON, Tex., Oct. 27.—Promise of two new Wilcox sand discoveries in Tyler County, and a scheduled production test of sands logged in the lower Wilcox in a 13,000-ft. well located in the Lake Creek field, Montgomery County, held the attention of operators along the Texas Gulf Coast district.

Stanolind 1 J. F Parker, located in the George T. W. Collins Survey, south of the Joe's Lake field, Tyler County, is drilling in shale below 8,457 ft. after logging additional showings of oil and gas at 8,434-36 ft. The company will drill to a total depth of 8,500 ft. where an electrical survey will be made, and casing may be cemented to test sand at 8,184-8,201 ft. where a 32-minute drill-stem test the previous week tested 85 lb. working pressure and recovered 10 thribbles of pipe-line oil. Top of the Wilcox was not announced, but it is assumed that the showings were logged in the upper section and the well may be drilled to the lower Wilcox before a production test is made. The well is located on a block of several thousand acres located near the town of Fred in the southeastern part of the county. Republic Production Co., and Houston Oil Co. hold considerable protection in the area.

Northwest of the above well, and about 2 miles west of the Joe's Lake field, Republic Production Co. 1 Smith-fee, H. M. Smith Survey, is drilling ahead in shale below 7,920 ft. after two drill-stem tests showed possible production. A 5-minute test at 7,683-94 ft. recovered 90 ft. of oil, while a second test at 7,688-99 ft. recovered 200 ft. of oily mud of which 80 per cent was oil, and 550 ft. of oil and salt water of which 50 per cent was estimated as oil. The well is drilling ahead following a 30-minute drill-stem test at 7,699-7,706 ft. which recovered 24 thribbles of salt water. While the top of the Wilcox was not released, the sand correlates about normal with that of the Joe's Lake field.

SUMMARY OF COMPLETIONS

	No.	Bbl.	Footage
Oil wells: Fields	18	4,493	114,586
Dry holes: Fields	1	.....	5,561
Wildcats	6	.....	52,141
Total	25	.....	172,288

Lake Creek Deep Well Preparing for Test

Superior Oil Co. of California 3 McWhorter, located in the Lake Creek field, Montgomery County, is being prepared for a production test after 2,445 ft. of 4¾-in. liner was cemented on bottom at 13,330 ft. This is the deepest test ever drilled along the Texas Gulf Coast, and certainly the most interesting well to be drilled along the Wilcox trend. Details as to where the well will be tested were not released although it is reported that an electrical survey showed several sands at intervals from 12,000-13,000 ft. Production from this interval would open a new horizon in the Wilcox, several thousand feet deeper than established production in two of the company's wells at intervals from 8,900-9,200 ft.

Wilcox Trend Extending

The above developments continue to place favorable light on the trend and leasing and geophysical activity has shown a large increase during the past few weeks. The play is being extended into the northern tier of counties including Madison, Walker, Trinity and Grimes counties which is more or less of an extension to the shallow Wilcox play originally started in Central Louisiana. Considerable acreage has been leased in this area and locations for several tests are expected to be announced in the near future. Along this trend, considerable interest is centered on Oswego Oil Co. 1 Boney located near the town of Iola in Grimes County. An electrical survey and side-wall cores are reported to have shown favorable indications, and 7-in. casing was cemented on bottom at 2,804 ft. preparatory to testing. West of the city limits of Madisonville, Madison County, Sun Oil Co. is preparing to spud 1 Dr. G. P. Day located in the John Crownover Survey. In Austin County, 3 miles west of the town of Sealy, Shell Oil Co., Inc., announced location for 1 John E. Hintz, a projected 11,000-ft. test located in the George T. Allen Survey.

Brazoria County Wildcat to Be Retested

Humble 1 Houston Farm Development Co., a wildcat located in the Perry & Austin Survey, Brazoria County, is preparing to retest after the well flowed 5 bbl. of salt water per hour with no show of oil or gas on a production test through perforated casing at 7,223-25 ft. Five and one-half-inch casing was cemented on bottom the previous week at 7,232 ft. after an electrical survey and side-wall cores showed possible production in the Frio at intervals from 6,800-7,200 ft.

New Locations at North La Ward and Conroe

The newly opened North La Ward field, Jackson County, received an interesting location as Gulfboard-Salt Dome Oil Corp. prepared to drill 1 Mary C. Dickey in Lot 1 of the Stephen F. Austin Survey, about 4,500 ft. southwest of Christie & Dunnam 1 Pickering, completed 2 weeks ago as a 1½-mile southwest extension to the field. Offsetting the Pickering producer to the south, Phillips Petroleum Co. is clearing location for 1 Jesse Johnson in Block 165 of the Patrick Scott Survey, while north of the well, Cities Service Oil Co. is expected to announce location for its first test.

The north extension area to the Conroe field, Montgomery County, is receiving additional development as locations for four tests were announced by A. C. Hill. The wells are 1 and 2 Peebles in the L. B. Wheeler Survey and 1 Clyde Brent and 1 J. Youens in the D. W. Collins Survey.

TEXAS GULF COAST COMPLETIONS

Wildcats

Brazoria County: Skelly 1 Vieman, dry, T.D. 9,964 ft.
Fort Bend County: Providence Oil Co. 1 Hruzek, top Cockfield 8,103 ft., Discorbis Yeguaensis 8,209 ft., Eponides Yeguaensis 8,284-94 ft., dry, T.D. 8,615 ft.
Harris County: Ralph Johnson 1 H. C. Cockburn, top Frio 5,560 ft., dry, T.D. 7,520 ft.
Lavaca County: Normandie Oil Co. 1 Smolik, dry, T.D. 8,015 ft.
Matagorda County: Barnsdall 1 C. T. Doman, dry, T.D. 10,110 ft.
Wharton County: Amerada 1 Elgington, top flat Marginulina 5,686 ft., Frio 5,790 ft., dry, T.D. 7,917 ft.

Fields

Anahuac, Chambers County: Humble 62 Middleton, 717 bbl., ¼-in. choke, sand 7,193-7,226 ft.
Esperson, Liberty County: Navarro 1 Danek, 196 bbl. ¼-in. choke, T.D. 8,062 ft., P.B. T.D. 8,034 ft.
Dyersdale, Harris County: H. C. Cockburn 17 Burkett 528 bbl., ¼-in. choke, sand 4,052-77 ft., T.D. 4,08. ft.
Ganado, Jackson County: Texas 5-A T. N. Mauritz 177 bbl., ⅛-in. choke, perf. casing 6,426-36 ft., T.D 6,530 ft.
Labelle, Jefferson County: Sun 10 Hebert, 429 bbl., ¼-in. choke, perf. casing 7,266-71 ft., T.D. 7,450 ft.
Lolita, Jackson County: Magnolia 6 Four Way Ranch, 182 bbl., 9/64-in. choke, perf. casing 5,944-46 ft., T.D. 5,948 ft.
Magnet, Wharton County: Humble 46 Cockburn, dry, T.D. 5,561 ft.
Martha, Liberty County: Stanolind 7-A Seaberg, 106 bbl., ⅛-in. choke, perf. casing 8,215-23 ft., T.D. 8,250 ft.
Oyster Bayou, Chambers County: Sun 1 Middleton, 862 bbl., ¼-in. choke, perf. casing 8,250-80 ft., T.D. 8,379 ft.
Orange, Orange County: Phillips 8 Stark, 124 bbl., ⅛-in. choke, perf. casing 3,495-98 ft., T.D. 3,550 ft.
Segno, Polk County: Gulf 48 Wing, 40 bbl. distillate, ¼-in. choke, perf. casing 5,360-70 ft., T.D. 11,743 ft.
West Columbia, Brazoria County: Texas 43 Abrams, 335 bbl., ¼-in. choke, perf. casing 5,650-75 ft., 5,691-96 ft., 5,702-05 ft., T.D. 5,749 ft.
West Ganado, Jackson County: Pure 3 E. T. Cravens, 132 bbl., ⅛-in. choke, perf. casing 4,735-50 ft., T.D. 4,854 ft.
Pure 3 J. R. Cravens, 123 bbl., ⅛-in. choke, perf. casing 4,730-55 ft., T.D. 5,552 ft.
West Ranch, Jackson County: Magnolia 25-A West Ranch, 110 bbl., 7/64-in. choke, perf. casing 5,094-99 ft., T.D. 5,100 ft.
Magnolia 207-A West Ranch, 94 bbl., 7/64-in. choke, perf. casing 5,760-65 ft., T.D. 5,768 ft.
Withers, Wharton County: F. W. Michaux 7-A Pierce, 108 bbl., 7/64-in. choke, perf. casing 5,383-91 ft., T.D. 5,408 ft.
F. W. Michaux 16-A Pierce, 184 bbl., 5/32-in. choke, perf. casing 5,534-49 ft., T.D. 5,386 ft.
Texas 79-B Pierce, 46 bbl., 6/64-in. choke, perf. casing 5,539-41 ft., T.D. 5,549 ft.

TEXAS GULF COAST DRILLING REPORT

Brazoria County: H. E. Hamilton 1 J. M. Smith, J. Hall Sur., drilling shale 6,420 ft.
Humble 1 R. L. Colley, J. M. O'Donnell Sur., drilling shale 8,901 ft.
H. A. Porter 1 L. A. McDonald, W. D. C. Hall Sur., drilling shale 7,150 ft., top Marginulina 6,210 ft., Frio 6,461 ft.
Fayette County: M. H. Miller et al 1 C. Holmcamp, J. M. Molin Sur., S.D. 2,894 ft.
Fort Bend County: Jack Frazier 1 Mason & Andrew Briscoe, J. Foster Sur., top Cockfield 6,895 ft., Eponides Yeguaensis 7,177 ft., drilling 7,825 ft.
Jackson County: J. L. Collins & Co. 1 H. Callaway, J. J. Linn Sur., drilling shale 3,175 ft.
Jefferson County: Stanolind 1 Anderson, T.&N.O. Sur. 173, Big Hill dome, drilling shale 7,560 ft.
Montgomery County: Atlantic 1 Foster Lumber Co., P. Gill Sur., drilling shale 11,185 ft.
Polk County: Pan American 1 Goodrich Community, A. Viesca Sur., T.D. 5,405 ft., running electrical log.
Pan American 1 Texas Long Leaf Lumber Co., A. Viesca Sur., T.D. 9,966 ft., P.B., sidetracked, drilling 3,987 ft.
Wharton County: Wynn Crosby Drilling Co. 1 Poole, A. J. Fry Sur., drilling sandy shale 9,410 ft.

Permian Basin, Panhandle Fields

(Continued from Page 171)

Lubbock County: Harrison & Foster 1 Steck, SE SE Sec. 7, Blk. A, J. Gibson Sur., 5,500-ft. test, drilling 4,195 ft.
Lynn County: Trinity Drlg. Co. 1 Auld, 660 ft. from S and E lines of N½ SW Sec. O, Blk. T, Callison Sur., 5,200-ft. test, S.D., orders, 5,202 ft.
Mitchell County: H. B. Owenby Drlg. 1 Morrison Oil & Royalty, SE NE Sec. 34, Blk. 29, T.&P. Sur., 3,100-ft. test, drilling 2,040 ft.
H. D. McQuain and W. J. Donnley 1 D. Wulfjin, NE SW Sec. 5, H.&T.C. Sur., 3,000-ft. test, spudded and S.D.
Gibson Drlg. Co. 1 C. C. Thompson, Sec. 71, Blk. 27, T.&P. Sur., 933 ft. from N and 467 ft. from W lines, 300-ft. test, rigging up tools.
Wes-Tex Oil Co. 1 Jones, Sec. 22, Blk. 29, T.&P. Sur., 467 ft. from N and 2,173 ft. from E lines, drilling water well.
Terry County: American Drlg. 1 W. T. Hufnall, 467 ft. from E and S lines Sec. 14, Blk. D-14, C.&M. Sur., 5,500-ft. test, drilling 4,600 ft.
Yoakum County: Honolulu Oil 1-1e Wright, 467 ft. from N and W lines Sec. 13, Blk. D, J. Gibson Sur., 5,500-ft. test, top San Andres 4,560 ft., drilling 5,384 ft.
Shell 1 M. L. Hammer, SW SW SW Sec. 490, Blk. D, J. Gibson Sur., P.B. to 5,351 ft. from 5,700 ft., 10,000 gal. acid, testing.

Nineteen Locations Staked In West Pampa Pool

FORT WORTH, Tex., Oct. 27.—The west Pampa pool is to undergo an intense drilling program during the coming weeks as 37 new locations were staked for the district and 19 of them in that field. On a lease recently purchased by Smith Bros. Refining Co. (Hanlon-Buchanan) development will start on full scale with 19 locations made.

During the week there were 15 tests completed, 14 for oil wells and one gas well. The total new daily initial amounted to 3,527 bbl. Accounting for the best well of the week and also the largest well in the Taylor field, the W. H. Taylor 8 fee, flowed for 2 hours and rated a daily potential of 792 bbl. The one gas completion was Magnolia 9 Britian, in Moore County, which rated a daily yield of 42,500,000 cu. ft.

TEXAS PANHANDLE COMPLETIONS

(24-hr. ratings)

Gray County

Phillips 9 James Foxx, Sec. 58, 43 bbl., pumping, 500-qt. shot, 3,085-3,165 ft.
Skelly Oil Co. 3 Lovett, Sec. 36, Blk. B-2, H.&G.N. Sur., 425 bbl., pumping, 454-qt. shot, 2,915-98 ft.
Skelly Oil Co. 136 Schafer, Sec. 171, Blk. 3, I.&G.N. Sur., 407 bbl., pumping, 300-qt. shot, 3,235-70 ft.
W. H. Taylor Oil Co. 7 fee, Sec. 24, Blk. B-2, H.&G.N. Sur., 66 bbl. oil and 2,000,000 cu. ft. gas, 416-qt. shot, 2,822-2,926 ft.
W. H. Taylor Oil Co. 8 fee, Sec. 24, Blk. B-2, H.&G.N. Sur., 99 bbl., pumping, 384-qt. shot, 2,855-70 ft.

Hutchinson County

J. E. Crosby, Inc. 43 Pitt, Sec. 7, Blk. M-21, T.C. Sur., 299 bbl., pumping, 480-qt. shot, 2,782-2,875 ft.
Danube Oil Co. 4 Sanford-A, Sec. 78, Blk. 46, H.&T.C. Sur., 174 bbl., pumping, 1,500 gal. acid, 2,805-20 ft.
Phillips 82 Cockrell ranch, Sec. 6, Blk. M-21, T.C. Sur., 233 bbl., pumping, 500-qt. shot, 2,827-2,965 ft.
Phillips 1 Houck, Sec. 25, Blk. M-23, T.C. Sur., 295 bbl., pumping, 460-qt. shot, 3,166-3,277 ft.
Phillips 7 Lizzie, Sec. 25, Blk. M-23, T.C. Sur., 259 bbl., pumping, 440-qt. shot, 3,220-72 ft.
Power Pet. Co. 11 Haile, Sec. 5, Blk. M-21, T.C. Sur., 55 bbl. oil and 233 bbl. water, 380-qt. shot, pay 3,000-61 ft., T.D. 3,066 ft.
Harry Stekol 11 Canadian-L, Sec. 21, Blk. 47, H.&T.C.

Sur., 51 bbl., pumping, 2,000 gal. acid, 2,815-2,920 ft.

Moore County

Magnolia 9 Britian, Sec. 174, Blk. 3-T, T.&N.O. Sur., 42,500,000 cu. ft. gas, 4,000 gal. acid, 2,720-2,900 ft.

Wheeler County

Gene Butler 1 Johnson, Sec. 40, Blk. 24, H.&G.N. Sur., 24 bbl., pumping, 240-qt. shot, 2,198-2,210 ft., T.D. 2,265 ft.

Pace & Ward 1 Patterson, Sec. 89, Blk. 13, H.&G.N. Sur., 315 bbl., pumping, 40-qt. shot, 2,076-2,088 ft.

New Mexico Strike May Open Major New Area

HOBBS, N. M., Oct. 27.—Eddy County's new sand discovery well 2¾ miles north of the Grayburg pool, Nay Hightower 1 Grier, stamped itself a strike of major importance when it gaged natural flow of 173 bbl. of 37.4-gravity oil in 23 hours through a 2-in. outlet off casing. Last reports from the pool opener stated operator was running an electrical survey. No. 1 Grier logged first body of oil sand from 3,062-72 ft., where it started heading oil, and by deepening encountered an increase in oil and gas in sand from 3,108-18 ft., the total depth.

The well has enlivened interest in the area, some oil men already classing it as the forerunner of a sand pool comparable to the Loco Hills area. The Hightower discovery producer is located 660 ft. out of the northwest corner of 31-16s-31e.

Production Test Due

Sanders Brothers 1 Harry Leonard, lime pay prospect 2 miles west and ¼ mile south of the Hightower well, is running tubing for production test. On last gage it flowed 41 bbl. of oil in 8 hours through a 1-in. outlet off casing. The well has been shot with 120 qt. from 2,940-80 ft., 2 ft. off bottom. Main pay was found in lime from 2,953-65 ft. No. 1 Leonard is 1,980 ft from the south and 660 ft. from the west line of 34-16s-30e, also 2¾ miles north of Grayburg production.

Location for a wildcat test 2 miles north of the Grayburg pool has been staked by Sanders Brothers as their 1 M. W. Evans, 1,980 ft. from the north and east lines of 4-17s-30e.

SOUTHEAST NEW MEXICO COMPLETIONS

Fields

Barber, Eddy County: Keyes & Atwood 1-A Keyes, 15-20s-30e, pumped 100 bbl. in 10 hr., natural, pay 1,512 ft., T.D. 1,515 ft.

Maljamar, Lea County: Cockburn 9-A Miller, flowed 60 bbl. in 4 hr., 320-qt. shot 3,962-4,075 ft., pay 3,967 ft., T.D. 4,075 ft.

Rutledge et al 2-B Mitchell, 17-17s-32e, flowed 85 bbl., 100-qt. shot 3,610-60 ft., pay 3,640 ft., T.D. 3,660 ft.

Red Lakes, Eddy County: Paton Bros. 5-A Russell, 35-17s-27e, pumped 100 bbl. in 9 hr., natural, pay 445 ft., T.D. 461 ft.

South Lovington, Lea County: Magnolia 3-F State, 2-17s-36e, flowed 60 bbl. in 13 hr., 100-qt. shot 4,940-80 ft., pay 4,948 ft., T.D. 4,980 ft.

Oklahoma Fields

(Continued from Page 171)

West Loco, Stephens County: Elko 2 Dilley, NW NE NE 7-3s-5w, dry, T.D. 1,367 ft.

Elko 1 Lowery, NW NE NW 8-3s-5w, dry, T.D. 1,151 ft.

South Maud, Pottawatomie County: Kerlyn 2 Cherry, NE NE NW 32-8-5, dry, T.D. 4,423 ft., Wilcox 4,423 ft.

Okemah district, Okfuskee County: Deep Rock et al 1 Camp, SE SE NW 20-11-9, gaged 4,750,000 cu. ft. gas, Hunton 3,855 ft., T.D. 3,914 ft.

Searight, Seminole County: Carter 4 Mayhue, S½ SE SW 11-9-6, dry, T.D. 3,513 ft.

Miscellaneous

Creek County: Morton 2 Harrison, NE NE NE 8-14-10, pumped 125 bbl., Woodford 3,168-85 ft., 6-in. 2,932 ft., T.D. 3,185 ft.

Muskogee County: Brogan 1 Board, SW SE SE 14-14-19, dry, T.D. 1,338 ft., Wilcox 1,333 ft.

Okmulgee County: Wood Oil 1 McAdoo, NW NW SW 27-13-13, pumped 25 bbl., pay 1,736-59 ft., 8-in. 1,180 ft., T.D. 1,759 ft.

Wallace 23 Colbert, SE SW NE 14-14-14, dry, T.D. 1,238 ft.

Bogie 3 Bean, SW SW SE 11-12-12, gaged 5,250,000 cu. ft. gas, pay 2,229-43 ft., 8-in. 1,480 ft., T.D. 2,243 ft.

Osage County: Marthan 8 Osage, NW SE NW 3-28-11, dry, T.D. 956 ft., Wayside 916 ft.

Herman Madvine 4 Osage, N½ N½ NE 33-25-11, pumped 8 bbl. oil and 5 bbl. water, Bartlesville 1,755-1,855 ft., 5-in. 1,805 ft., T.D. 1,891 ft.

Barnsdall 4 Osage, SE NE NE 10-24-11, pumped 25 bbl., Bartlesville 1,760 ft., 7-in. 1,723 ft., T.D. 1,791 ft.

Texas 1 Osage, SW SW SW 9-23-7, flowed 274 bbl., pay 2,963-3,014 ft., 5-in. 2,881 ft., T.D. 3,014 ft.

Oklahoma Natural 1 Osage, SW SW SE 24-22-9, flowed 408 bbl., Arbuckle 2,488-93 ft., 6-in. 2,449 ft., T.D. 2,493 ft.

Tulsa County: Bert Swift 1 Anthis, NW SE SE 14-19-10, dry, T.D. 1,921 ft., Bartlesville 1,895 ft.

Anthony 12 fee, SE SW NW 3-16-12, gaged 3,500,000 cu. ft. gas, pay 1,712-15 ft., 8-in. 1,715 ft., T.D. 1,715 ft.

E. H. Light 2 Palmer, NW SE NW 9-21-13, swabbed 100 bbl., New Tucker 1,281 ft., T.D. 1,305 ft.

Recompletions

Cement, Caddo County: Stephens 2 Farwell, SE SE SW 27-6-10w, est. 50,000,000 cu. ft. gas, old well perf. at 5,065-5,115 ft. and 4,680-4,765 ft., T.D. 5,727 ft.

West Hewitt, Carter County: Smith 10 Ward, NE NE NE 19-4s-2w, old well drilled deeper, flowed 395 bbl., pay 2,021-2,285 ft., old T.D. 2,012 ft., T.D. 2,285 ft.

Hobart, Kiowa County: Phillips 1 Warner, NE NE SW 19-7-17w, old T.D. 1,058 ft., T.D. 1,135 ft., pumped 84 bbl.

OKLAHOMA DRILLING REPORT

Bryan County: Sinclair Prairie 1 Irwin, SW SE SE 18-6s-12e, drilling sand 1,823 ft.

Caddo County: Ray Stephens 1-A Johnston, NW NE NW 18-5-8w, top sand 3,293 ft., cored sand, show oil 3,299-3,305 ft., cored sandy shale 3,305-15 ft., drilling 3,321 ft.

Amerada 1 Sprages, SE NW 11-8-12w, drilling shale 7,120 ft.

Denver 1 Sah-Cam, SE SE 33-10-10w, drilling 10,660 ft.

Comanche County: Texas 1 Gamble, SW NE SE 5-3-10w, Woodford 4,128 ft., drilling 4,646 ft.

Texas 1 State, SW SE NW 13-3-10w, drilling 5,936 ft. in Pontotoc shale.

Texas 1 School Land-B, SW SW 13-4-11w, base Viola 2,735 ft., Sylvan dolomite 3,103 ft., Sylvan shale 3,125 ft., drilling 3,365 ft.

Denver 1 Hayes, NE NE SW 14-4-11w, drilling 2,050 ft.

Garvin County: Ohio 1 Freeman, SE SE SE 14-1-1w, base Pontotoc 2,470 ft., T.D. 4,365 ft., perf. 1,579½-84 ft., no results, perf. 1,566-79½ ft., no results, perf. 715-25 ft., show gas, acid, H.F.W., S.D.

Jackson County: Rhinehart 1 Petzold, SE SE NE 20-3-20w, T.D. 3,791 ft., drill pipe stuck, S.D.

Kiowa County: E. M. Thomason 1 Baker, NW NE NW 7-6-18w, drilling 642 ft.

Stauffer 1 Mayo, NE NE NW 13-6-18w, S.D. 1,000 ft.

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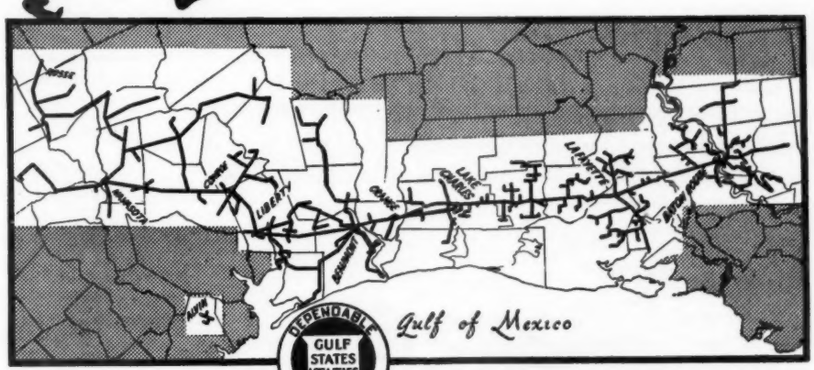

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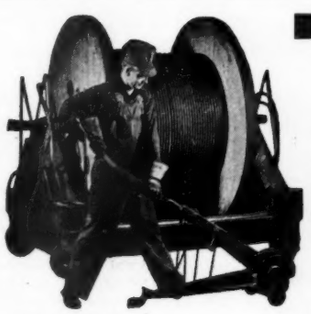

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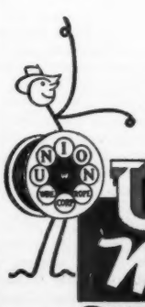

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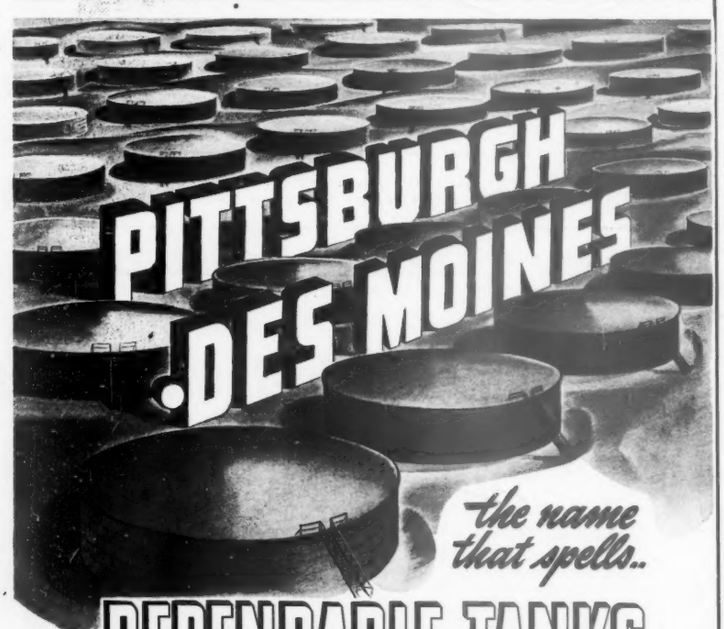

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MICHIGAN OPERATIONS

Eleven New Producers Are Completed at Reed City

By OTTO C. PRESSPRICH

SAGINAW, Mich., Oct. 27.—New wells flowing initially at rates up to 8,400 bbl. a day were completed during the past week in Michigan's Reed City field which set a new record for a week with the recording of 11 new producing wells, a small natural gasser, and a dry hole, while one location was abandoned. The new potential of the field increased by nearly 37,000 bbl. a day, as a result. The spurt in completions, meanwhile, promised to continue the state's increasing production despite more drastic proration ordered by the state for the 5-month-old field.

SUMMARY OF COMPLETIONS

Oil wells:	No.	Bbl.	Footage
Allegan County	3	400	3,159
Clare County	1	97	3,783
Gladwin County	1	250	3,889
Osceola County	11	36,980	39,545
Van Buren County	2	157	3,785
Gas wells	4	*4.3	5,277
Dry holes: Fields	4	.....	13,743
Wildcats	5	.....	12,113
Total	31	.....	85,294

*Million cu. ft.

MICHIGAN PRODUCTION
Daily Average for September 1941

	Wells	Bbl.
Porter-Yost	337	4,233
Greendale Chippewa	176	1,237
Sherman-Isabella	61	704
Vernon-Leaton-Denver	73	689
Wise-Isabella	61	831
Reed City-Osceola	45	15,723
Freeman-Redding	144	4,316
Winterfield-Clare	5	4,677
Beaverton-Grout	25	393
Buckeye-North and South	288	2,371
Edenville	26	159
Bentley	35	252
Ogemaw County	223	1,027
Roscommon County	1	619
Clayton-Arenac	50	712
Monitor-Bay County	7	653
Adams-Arenac	31	3,151
Saginaw City	51	57
Birch Run	25	16
Dundee-Monroe	18	200
Crystal-Wyman	34	254
Amble-Montcalm	3	51
Muskegon	56	39
Holland-Zeeland	3	5
Allegan—all pools	522	3,204
Walker-Wo.-Tallmadge	474	3,306
Van Buren—all pools	283	2,889
Total	3,056	51,768

The compilation of September production by the Michigan Oil and Gas Association revealed the state's production at a 13-month peak, increasing nearly 250,000 bbl. over the previous month as the daily average jumped from 42,184 bbl. in August to 51,768 bbl. last month.

Reed City field's September output was slightly under 500,000 bbl., which more than tripled that of any other field in Michigan as it rushed to firmer first-place rating.

The accelerated exploration pace also was maintained during the week as the State Conservation Department approved 21 permits for drilling in 11 counties. Bay County led the list with four permits, Osceola had three, Gladwin, Allegan, Roscommon, Van Buren, and Arenac two each, and Montcalm, Isabella, Genesee, and Clare one each.

With the state Oil Advisory Board keeping close watch on the Osceola and Roscommon activities, another production cut was put in effect Saturday in the Reed City section where Traverse formation oil now is limited to 800 bbl per day per well. This production is from the upper pay. To date only Pure Oil Co. has a Traverse completion in the field. It has been producing near 2,000 bbl. a day. Gulf Refining Co. also has a new well in the Traverse which will be governed by the new order. The Oil Advisory Board met to further consider spacing of wells in connection with an effort to encourage economy in use of steel as a national-defense cooperation effort.

Aside from Reed City, there have been few recent developments in Michigan. For the entire state last week there were 32 completions, near the year's peak, but of the 7 producing wells in addition to the Osceola development only 1, completed in Hopkins-Allegan for 300 bbl. a day initial, was of interest. Small gas wells were completed in four counties.

MICHIGAN COMPLETIONS

Allegan County

Hopkins Township: Clifford A. Perry 1 McDermott, NE SW NW 18-3n-12w, wildcat, 300 bbl. in 15 hr., acid, T.D. 1,552 ft.

Monterey Township: W. Spencer Cook 1 Layton, NE SE NE 13-3n-13w, wildcat, dry, T.D. 1,607 ft.

Salem Township: George Kernodle 1 Bond estate, SW NW SE 10-4n-13w, dry, T.D. 1,650 ft.

John H. McLean 4 Zerfas, SE NW SE 10-4n-13w, 10 bbl., acid, T.D. 1,607 ft.

Arenac County

Deep River Township: W. E. Ross 1 Mutch, SE NW SE 17-19n-4e, wildcat, 1,160,000 cu. ft. gas, T.D. 1,528 ft.

Clare County

Winterfield Township: Sun Oil Co. 1 Hamer, W½ SE NW 29-20n-6w, 97 bbl., natural, T.D. 3,783 ft.

Taggart Bros. Co. 34 Nevins-Chapin, C NW 19-20n-6w, 400,000 cu. ft. gas, T.D. 1,411 ft.

Gladwin County

Beaverton Township: Sun Oil Co. 1 Keller, E½ NE NE 35-17n-2w, 175 bbl., first 17 hr., after acid, T.D. 3,889 ft.

Whitehill & Drury 3 Yeager, NW NW NE 36-17n-2w, dry, T.D. 4,977 ft.

Isabella County

Denver Township: Burks White-Rowmor Corp.-Leonard Drilling Co. 1 Swan, E½ NE NE 4-15n-3w, dry, T.D. 3,822 ft.

Mason County

Meade Township: Gordon Oil Co. 1 Cartier, SE SE SE 30-20n-15w, dry, T.D. 3,256 ft.

Midland County

Greendale Township: Atha Supply Co. 7 Stapleton, NW NE 13-14n-2w, dry, T.D. 3,559 ft.

Missaukee County

Aetna Township: Turner Petroleum Corp. 1 Blue, N½ NW SW 33-22n-6w, wildcat, dry, T.D. 3,955 ft.

Montcalm County

Ferris Township: R. A. Wells 1 O'Brien, SW SE NE 22-11n-5w, wildcat, 1,500,000 cu. ft. gas, T.D. 1,095 ft.

Osceola County

Hartwick Township: Turner Petroleum Corp. 3 Gas unit, NW SW NW 27-19n-8w, wildcat, dry, T.D. 1,640 ft.

Lincoln Township: Peter J. Boiger 1 State, N½ NW NW 33-18n-10w, location abandoned.

Pure Oil Co. 1 Small, S½ NW NE 29-18n-10w, 7,608 bbl., T.D. 3,546 ft.

Pure Oil Co. 1 Dunn, S½ SW SE 20-18n-10w, 4,284 bbl., T.D. 3,550 ft.

Pure Oil Co. 1 Campbell, S½ NW SW 19-18n-10w, 3,120 bbl., T.D. 3,617 ft.

Don Rayburn 1-A Gabel, N½ SW SW 31-18n-10w, 20 bbl., after acid, T.D. 3,686 ft.

Taggart Bros. Co. 25 Johnson-Richard-Eisenberg, C SW 17-18n-10w, 1,230,000 cu. ft. gas, T.D. 1,243 ft.

(Continued on Page 194)

Five New Wildcats Revive East Texas Exploration

By D. H. STORMONT

DALLAS, Tex., Oct. 27.—Wildcatting activity, which has been quiet in this district since the middle of the summer, was suddenly revived this week, as a result of several weeks of renewed interest in leasing and blocking. Five new operations were announced; two in Leon County and one each in Angelina, Hopkins and Smith counties.

Two deep exploratory tests are scheduled for Leon County, which has seen little exploration since Woodbine oil and gas production was discovered on the Buffalo dome. A 7,000-ft. wildcat has been staked 2 miles northeast of Centerville by H. L. Hunt. On a farmout from Magnolia, the test will be drilled as 1 D. A. Sullivan, 467 ft. from the south and east lines of a 342.5-acre tract in the F. Romeriz Survey. Rig was being moved in over the week end and a thorough test of the Woodbine is expected.

SUMMARY OF COMPLETIONS

	No.	Bbl.	Footage
Oil wells: East Texas field	9	†367	32,724
Hawkins	9	2,075	43,923
Gas wells: Fields	2	*123	9,860
Dry holes: Wildcats	1		3,525
Total	21		90,032

*Million cu. ft. †Hourly gage.

In the northeast corner of the county, J. R. Elliott is moving in material for the immediate drilling of 1 C. W. DeVaughn, 2 miles northwest of Navarro Crossing and north of production in the Navarro Crossing field. The wildcat has been staked 930 ft. from the southeast and 467 ft. from the southwest lines of a 150-acre tract in the William Little Survey.

In the extreme southeastern part of the district, Angelina County will have a new deep wildcat test under way soon. Six miles southwest of the town of Huntington, K. L. McHenry, geologist, and associates are moving in material and will spud 1 Southern Pine Lumber Co. the first of the week. Contracted to 5,500 ft., the wildcat is located 11,220 ft. from the north and 1,320 ft. from the east lines of the J. G. W. Clayton Survey.

With the failure of 1 Peek, in Delta County, Talco Asphalt & Refining Co. have staked another test for the Paluxy sand, which 1 Peek found dry at 4,698 ft. The new wildcat, to be drilled in association with W. B. Hinton, has set surface casing and will be drilled on the S. W. Long farm, 3 miles west of Birthwright, in the Acquier Survey, Hopkins County. No. 1 Long is 15 miles east of Talco and is said to be on a separate structure.

In Smith County, derrick is up for immediate drilling of B. F. Phillips 1 J. C. McCormic, 467 ft. west of the easterly southeast corner of a 391-acre tract in the W. W. Avery Survey. The wildcat will test the Woodbine sand. Location is 2 miles northeast of Friendship in the northeast corner of the county.

Rusk County Wildcat Blows Gas

Rusk County's new wildcat operation, O. W. Killam 1 Barnett Bass, has evidently encountered a gas pocket. At 2,980 ft., total depth, the test drilled a gas-bearing formation with sufficient pressure to unload the hole, blowing out mud and wash water. The gas blow was under control at the end of the week and the test shut in, with 200 lb. pressure.

No. 1 Bass, J. I. Sanchez Survey, is 2½ miles north of New Salem and about that same distance southwest of and along the same fault system as the Pleasant Grove Woodbine sand pool, which, this week, completed its third producer. The new completion is L. O. McMillan 2-A Strong & Pool, J. R. May Survey, a southeast offset to the discovery well. No. 2-A Strong & Pool was completed from the sand at 4,069 ft. for an estimated daily potential of 300 bbl. of oil. No water was reported.

Wildcat in Freestone County to Test

As a result of an electrical survey, which logged a promising sand section around 3,378 ft., the Freestone County wildcat, taken over by O. B. Perot from Westbrook & Whistler, is planning to test. Casing will be set and operator will test the section through perforations. The wildcat is 1 J. B. Coleman, in the Howard Survey, and has been shut down since the middle of September.

EASTERN TEXAS COMPLETIONS

Wildcats

Gregg County: Roger Lacev 1 Horton-Dickson, J. L. T. Meredith Sur., 60.000.000 cu. ft. of gas and 14½ bbl. distillate, S.I. until recycling plant is constructed.

Navarro County: J. B. Daniels 1 C. C. Mills, T. J. Jordan Sur., dry at 3.525 ft.

East Texas Field

(1-hr. gage)

Joiner, Rusk County: R. E. Fair, Inc., 20-A B. F. Maxwell, E. Collard Sur., 60 bbl., pay 3,709 ft., T.D. 3,753 ft.

Kilgore, Gregg County: Barnett Pet. Corp. 5 Dickson & Saxon, M. V. Winkle Sur., 45 bbl., pay 3,537 ft., T.D. 3.573 ft.

Barnett Pet. Corp. 6 Dickson & Saxon, M. V. Winkle Sur., 25 bbl. 3.485 ft., pay 3.548 ft., T.D. 3.570 ft.

Barnett Pet. Corp. 7 Dickson & Saxon, M. V. Winkle Sur., 45 bbl. 3,474 ft., pay 3.545 ft., T.D. 3.572 ft.

Sinclair A-70 A. A. King, P. W. Warriner Sur., 60 bbl., pay 3.466 ft., T.D. 3.524 ft.

Bowles Oil Co. 22 D. Wells, 50 bbl., pay 3,709 ft., T.D. 3,753 ft.

Longview, Gregg County: Selby Oil & Gas Co. A-31 Snarley heirs, W. Tynadle Sur., 20 bbl., perf. casing 3.598-3,601 ft., pay 3,598 ft., T.D. 3,706 ft.

Selby Oil & Gas Co. B-37 Snarley, F. W. Johnson Sur., 20 bbl., pay 4,565 ft., T.D. 3,567 ft.

C. A. Lee and R. W. Burnett 2 Mike Green, H. W. Augustine Sur., 42 bbl., pumping, pay 3,704 ft., T.D. 3,706 ft.

Other Field Completions

Long Lake, Anderson County: Hunt Oil Co. 2 R. M. Johnson, S. Sanches Sur. 1-11, 115,000.000 cu. ft. gas, est. 14 bbl. distillate per million, T.D. 5,370 ft.

Hawkins, Wood County: R. W. Fair and Fair Foundation 1 M. B. Hamill, J. P. Moselev Sur., 103 bbl. in 8 hr., ¼-in. choke, pay 4,678-5.034 ft.

Humble B-2 L. A. Bryan, W. Parker Sur., 117 bbl. in 6 hr., ¼-in. choke, 4,768-73 ft., T.D. 4,831 ft.

Humble 3 M. A. Kay, B. N. Hampton Sur., 105 bbl. in 6 hr., pay 4,404 ft., T.D. 4,832 ft.

Humble B-1 J. B. Kirkpatrick, H. E. Watson Sur., 8,000,000 cu. ft. gas, ⅝-in. choke, pay 4,058 ft., T.D. 4,490 ft.

Humble A-1 J. M. McClain, H. Paine Sur., 250 bbl. in 24 hr., ¼-in. choke, top Woodbine 4,775 ft., pay 5,005 ft., T.D. 5,063 ft.

Humble 1 A. C. Pruitt, G. Brewer Sur., 113 bbl. in 6 hr., ¼-in. choke, pay 4,504 ft., T.D. 4,834 ft.

R. Lacy 4 Wm. Pouncey, J. P. Moseley Sur., 87 bbl. in 6 hr., ¼-in. choke, T.D. 4,925 ft.

S. Price 1 Gladys Maberry, S. Castleberry Sur., 101 bbl. in 6 hr., ¼-in. choke, T.D. 4,730 ft.

Stanolind 2 C. C. Miller, J. P. Moseley Sur., 99 bbl. in 6 hr., ¼-in. choke, pay 4,640 ft., T.D. 4,864 ft.

O. F. Wencher 2 L. M. Slaughter, G. Brewer Sur., 126 bbl. in 6 hr., ¼-in. choke, T.D. 4,810 ft.

EASTERN TEXAS ACTIVE WILDCATS

Angelina County: K. L. McHenry 1 Southern Pine Lbr., 11,220 ft. from N and 1,320 ft. from E lines J. G. W. Clayton Sur., moving in rotary.

Camp County: Talco Asphalt Co. 1 McKenzie, L. Williams Sur., ¾ mi. W of Pittsburg field, 12 bbl. in 19 hr., T.D. 8,200 ft.

Freestone County: Westbrook & Whistler 1 Coleman, H. Howard Sur., 2½ mi. SW of Streetman, running casing, T.D. 3,506 ft.

Henderson County: British American Oil 1 Young, Joseph Rice Sur., 7½ mi. SW of Athens, reperf. casing, 34 shots, swabbing, 7,608-24 ft., T.D.

Lone Star Gas 2 C. H. Allen, 3,490 ft. from W and 4,780 ft. from S lines, John Lawson Sur., top Pettit 9,328 ft., top Travis Peak 9,486 ft., to set casing at 8,700 ft. to test Rodessa, T.D. 9,741 ft.

Hopkins County: W. B. Hinton and Talco Asphalt Co. 1 S. M. Long, 4,000 ft. from E and 650 ft. from S lines, W. Acquier Sur., drilling 211 ft.

Houston County: C. P. Culmore 1 G. T. Luncy, John Forbes Sur., 1½ mi. SE of Lovelady, 467 ft. out of SE cor. of NE 40 acres of 310-acre tract, drilling at 2,100 ft.

Hunt County: J. B. and Ed V. Parsons 1 O. P. Marshall, D. Ausmus Sur., E of Commerce, 475 ft. from N and 112 ft. from W lines of 100-acre tract, drilling at 218 ft.

Cable Tool Drlg. 1 J. D. Williams, 467 ft. from E and 2,175 ft. from S lines, Wm. Elam Sur., Austin 1,985-2,465 ft., drilling 4,005 ft.

Leon County: Hunt Oil Co. 1 D. A. Sullivan, F. Ramirez Sur., 467 ft. from S and 467 ft. from E lines of 432.5-acre tract, location, first report.

J. R. Elliott 1 G. W. DeVaughn, Wm. Little Sur., 930 ft. from SE and 467 ft. from SW lines, moving in material, first report.

Robertson County: R. O. Pinkerson 1 Anderson, Jas. Webb Sur., 6 mi. NE Calvert, S.D. 1,516 ft., repairs.

Rusk County: O. W. Killam 1 Bass, J. I. Sanches Sur., 467 ft. from S and 3,200 ft. from E lines of 160-acre tract, well blew out making mud, wash out, and gas, S.I., T.D. 2,980 ft.

Smith County: B. F. Phillips 1 J. C. McCormic, W. W. Avery Sur., 1,400 ft. from N and 467 ft. from W lines, Woodbine test, building derrick, first report.

Wood County: A. L. Andree 1 Henry, 467 ft. from N and E lines of 140-acre tract in J. Ewing Sur., drilling at 450 ft.

Humble 1 J. C. Snow, 467 ft. from W and 2,250 ft. from N lines in J. B. Crain Sur., Austin 4,180-4,410 ft., drilling at 4,480 ft.

Rocky Mountain Area

(Continued from Page 174)

Texas 4 Willis, SW SE SW 18-32n-5w, location, first report.

Hill County: Montana-Dakota Utilities 1 fee, NW NW NW 24-32n-17e, drilling 650 ft., 8¼-in. 640 ft., first report.

Phillips County: Montana-Dakota Utilities 633 Kohnlein, C Lot 2, 30-32n-34e, drilling 1,075 ft., 5½-in. 786 ft., first report.

Montana-Dakota Utilities 649 Kippen, C NW NE 25-32n-33e, drilling 200 ft.

Montana-Dakota Utilities 656 Federal Land Bank, C SE NE 8-31n-32e, cemented 8⅝-in. 102 ft., and S.D.

Toole County: L. J. Yealy 16 Shaw, NW NW NE 35-36n-2w, T.D. 1,745 ft., shot 60 qt., rigging to pump.

Montana-Dakota Utilities 327 Donovan, C NW SE 31-34n-1w, drilling 925 ft., 10-in. 220 ft.

Hat Oil 1 Mitchell, C NE SW 24-37n-3w, S.D. 1,310 ft., repairs.

E. O. Reickhoff 1 Reickhoff, C NE SW 3-32n-2w, standing 60 ft.

J. H. Agen 18 Goeddertz, CSL NE SW 23-35n-3w, location.

Harmon & Morton 1 Sohn, SW SW NE 23-35n-3w, spudded to 60 ft. and S.D.

Montana-Dakota Utilities 329 Gypsy Parker, C SE NW 23-33n-2w, drilling 1,110 ft.

Nepstad Oil 3 Hugi, C SE NW 11-35n-3w, rig.

Casper T. Olen 12 Engermoen, NE SE NW 14-35n-2w, drilling 1,532 ft. in lime, contact 1,523 ft., dry.

Big West Oil 1 Anderson, SW SW NE 12-35n-4w, drilling 1,640 ft.

A. A. Oil Co. 1 Fey, SW SE SE 32-37n-2e, T.D. 300 ft., waiting on 10-in.

Colonel Kevin Oil 10 Govt., C NW NE 27-35n-3w, T.D. 1,475 ft., Sunburst 1,415-45 ft., dry, cemented 6⅝-in. 1,475 ft.

High Gravity Oil 3 Govt., SE NE SW 18-35n-3w, cemented 10-in. 241 ft.

Nepstad-Montgomery-Fargher 4 Haugen-2, CSL SW SW 2-35n-3w, drilling 1,240 ft., 8¼-in. 1,060 ft.

Dakota-Montana Oil 26 Govt., CNL NE NW 19-35n-1w, standing rigged.

Gordon Plotke 4 Ward, SE SW SW 28-35n-3w, cemented 10-in. 150 ft.

Superior Pet. 4-A Govt., C SE NW 24-35n-3w, drilling 1,380 ft., Sunburst dry at 1,335-60 ft.

Welch Brothers 5 Zachor, CWL NW NE 29-35n-1w, cemented 8¼-in. 161 ft.

Frank P. Walsh 1 Dempter, C NE SW 20-33n-2e, drilling 600 ft., first report, Devon field.

L. J. Yealy 17 Shaw, NE NE SW 35-36n-2w, location, first report.

NORTHWEST NEW MEXICO DRILLING REPORT

San Juan County: Carroll & Cornell 5 Cornell-Government, NE NE 23-29n-12w, testing sand at 940-80 ft., pumped 52 bbl. in 6½ hr. before running casing, testing.

San Miguel County: Southwest Drilling 1 Conchas, NW NE 34-17n-21e, S.D. 3,512 ft., contract completed.

Torrance County: Cardinal Oil 1 State, SE SW 3-8n-14e, cemented 8¼-in. 1,022 ft., show of gas.

Western Kentucky

(Continued from Page 172)

Henderson County, Hebbardsville district: Snowden & McSweeney 2 Sallie Conway, 15 bbl., natural, Jett sand, T.D. 1,616½ ft.

Niagara district: W. K. Snyder 8 J. P. Cosby, 10 bbl., shot, Niagara sand 694-707 ft.

McLean County, Grindstone Hill district: Cameron 4 J. F. Kerrick, flowed 200 bbl., acidized, McClosky, T.D. 1,696 ft., old T.D. 1,433 ft.

Muhlenberg County, Belton district: Stewart 1 Goodall, 4,000,000 cu. ft. gas, Jones sand 624-62 ft., T.D. 696 ft.

Ohio County, Aetnaville district: R. R. Hart 4 I. T. Westerfield, dry, T.D. 428 ft.

Pleasant Ridge district: Teller 1 Archie Moseley, dry, T.D. 1,092 ft.

Fourth Oil Well Completed From Oriskany Big Lime

By STAFF CORRESPONDENT

PITTSBURGH, Pa., Oct. 27.—Work in the lower eastern fields continues at a high rate with the week being featured by a large gas well in the Oriskany fields and one fair oil well in West Virginia.

SOUTHWEST PENNSYLVANIA

On Chestnut Ridge in South Union Township, Fayette County, Peoples Natural Gas Co. topped the Oriskany sand at 6,774 ft. in 5 Piedmont Coal Co., giving the Onondaga chert a section about 220 ft. thick. This well was carrying about 850,000 cu. ft. of gas from the chert beds and gas increases were noted at 6,748 ft., 6,770 ft., and 6,795 ft., increasing the volume to 1,000,000 cu. ft. It is drilling at 6,805 ft. This company's No. 6, same lease, is drilling at 7,396 ft. and has not reached the Onondaga.

In Maryland New Penn Development Co. et al have reached 8,002 ft. in the test on the Schartzer (Humberson) farm on the Accident dome in Garrett County, or about 95 ft. below the top of the Onondaga chert. So far there has been no gas nor water.

Clarion County

Clarion Township: Jefferson and Elk Gas companies 1 J. E. Reinsel, 16,000 cu. ft. gas, Bradford sand, T.D. 3,232 ft.

Monroe Township: Frank Shreffler et al 1 Harry McCall, 30,000 cu. ft. gas, Hundred-foot sand, T.D. 1,320 ft.

Porter Township: Hanley & Bird 2 J. C. Wilson, 42,000 cu. ft. gas, Speechley sand, T.D. 2,669 ft.

Greene County

Cumberland Township: Brummage et al 1 C. and L. Hathaway, 179,000 cu. ft. gas, Elizabeth sand 2,897 ft., gas 2,898-2,901 ft., T.D. 2,935 ft.

Wayne Township: Manufacturers Light & Heat Co. 3 Halsie Tustin, 212,000 cu. ft. gas, Bayard stray sand 3,395 ft., gas 3,396 ft., T.D. 3,470 ft.

Washington County

Morris Township: Union Gasoline & Oil Corp 1 F. B Grimes, dry, Fifth sand 2,898-2,931 ft., T.D. 2,935 ft.; show oil top of sand.

WEST VIRGINIA

In Kanawha County Columbian Carbon Co. brought in another fair well on the Homer C. Jones farm in Poca district in the oil lens in the Big lime. It was estimated good for 200 bbl. a day flush production and from a depth of 1,647 ft. This is located in the Oriskany gas pool area and discovered while drilling for that horizon. On this lease, No. 1 is an Oriskany gas well and Nos. 2, 3, and 4 Big lime oil producers The farm is now being offset to the east and north.

In Freemans Creek district, Lewis County, Hope Natural Gas Co. is drilling at 7,325 ft. in the rotary test on the Alfred Woofter farm and will shut down to test the Onondaga lime and chert and the Oriskany. In Monongalia County this company is drilling at 7,450 ft. in the test on the H. C. Greer et al lease in Morgan district, or 104 ft. below the top of the Onondaga lime. No sustained gas volume has been found in the chert but there have been some gas pockets.

The Oriskany areas in Kanawha, Jackson, and extending into part of Putnam County are extremely active with over 70 rigs active. In addition, new locations are waiting on material and derricks stand waiting on tools and crews. In Jackson County operators are still testing outside edges, many of which are interesting. The extent covered by these fields is greater than any deep field in the East.

SUMMARY OF COMPLETIONS

Southwest Pennsylvania

	No.	Bbl.	Footage
Gas wells	6	*0.5	16,124
Dry holes	1	.....	2,935
Total	7	.....	19,059

West Virginia

	No.	Bbl.	Footage
Oil wells	3	26	6,447
Gas wells: Oriskany	8	*39.2	36,172
Other fields	12	*3.0	31,907
Dry holes	2	.....	4,874
Total	25	.....	79,400
Recompletions	2	*0.1	.....

*Million cu. ft.

Boone County

Scott district: Owens, Libby-Owens 38 Cassingham Coal Land Co., 69,000 cu. ft. gas, Berea, T.D. 2,444 ft.

Cabell County

Barboursville district: Cumberland Gas Co. 1 Hiram Burgess, 73,000 cu. ft. gas after shot, Big lime 1,413-1,575 ft., Big Injun 1,620-1,729 ft., Berea 2,206-20 ft., brown shale 2,900-85 ft., brown shale 3,032-3,288 ft., T.D. 3,298 ft.

Clay County

Buffalo district: Pittsburgh & West Virginia Gas Co. 7807 F. L. Hall, 800,000 cu. ft. gas, Blue Monday sand, T.D. 2,095 ft.

Gilmer County

DeKalb district: Hope 6782 Edward Reynolds, 250,000 cu. ft. gas and 3 bbl., Maxton sand, T.D. 1,725 ft. Clem Morris et al 1 Wash Barnes, 25,000 cu. ft. gas, Big Injun sand, T.D. 2,119 ft.

Lewis County

Freemans Creek district: McCall Drilling Co. 3 Alfred & Griggs, 50,000 cu. ft. gas, Big Injun 1,820-1,935 ft., gas 1,884-1,905 ft., T.D. 1,960 ft.

Lincoln County

Carroll district: W. C. Kingery 1 Thomas Turley, 148,000 cu. ft. gas, brown shale, T.D. 3,591 ft.

Duval district: Huntington Development & Gas Co. H274 fee, drilled deeper, 52,690 cu. ft. gas after shot, started deepening 2,228 ft., brown shale 2,508-70 ft., 3,210-3,493 ft., and 3,493-97 ft., R.P. 375 lb.

Washington district: South Penn 3 S. O. Dunlap, 3 bbl., Berea, T.D. 2,882 ft.

Logan County

Logan district: South Penn 63 Yawkey-Freeman, 730,000 cu. ft. gas after shot, Berea, T.D. 2,350 ft.

Marion County

Mannington district: South Penn 1 S. Toothman, drilled deeper from Gordon sand, 25,000 cu. ft. gas, Fourth sand, T.D. 3,540 ft.; may also produce from Gordon.

Monongalia County

Cass district: Carnegie 1 Abraham Reed, 20,000 cu. ft. gas, Pittsburgh coal 502-07 ft., Big Injun 1,935-45 ft., Fifth 2,951-53 ft., T.D. 2,983 ft., will abandon.

Putnam County

Curry district: Massey Oil & Gas Co. 2 Walter Johnson, 425,000 cu. ft. gas, Berea, T.D. 2,347 ft.

Ritchie County

Grant district: Square Oil Co. 6 Merle Carpenter, 20 bbl., Squaw sand, T.D. 1,930 ft.

Norris & Mercer 1 Frances Eddy, dry, Squaw, T.D. 1,891 ft.

Union district: William Shroeder 2 P. S. Burbridge, drilled deeper, 300,000 cu. ft. gas, Squaw sand, T.D. 2,014 ft.

Tyler County

Union district: Gale Oil Co. 2 George T. Gale, 3 bbl., Maxton, T.D. 1,635 ft.

Upshur County

Buckhannan district: Pittsburgh & West Virginia Gas Co. 7837 W. E. Sutton, 100,000 cu. ft. gas, Gordon sand 2,495-2,557 ft., gas 2,544-55 ft., Benson sand 4,568-90 ft., T.D. 4,724 ft.

ORISKANY GAS FIELDS

Jackson County

The largest gas strike in the Oriskany fields during the week was the test of the United Fuel Gas Co. 5041 E. L. Harrison in Ripley district, completed at a total depth of 4,965 ft. with an open flow before shot of 16,696,000 cu. ft. of gas. The Corniferous was topped at 4,839 ft.; Oriskany 4,945 ft.

Ravenswood district: Joe Rubin 1 H. A. and O. H. Maddox, drilled deeper in the Oriskany sand to 5,036 ft. and shot, 73,000 cu. ft. gas and 4 bbl., Corniferous 4,978 ft., Oriskany 4,995 ft.

Ripley district: West Virginia Gas Corp. 1 H. T. Faber, 7,294,000 cu. ft. gas, Corniferous 5,030 ft., Oriskany 5,145 ft., T.D. 5,185 ft.

R. E. McCabe 1 Icy Hammack, 6,625,000 cu. ft. gas, Corniferous 5,119 ft., Oriskany 5,223 ft., T.D. 5,270 ft.; it was not shot.

Godfrey L. Cabot, Inc., 22 Putnam Co., 2,466,000 cu. ft. gas before shot, Corniferous 5,187-5,281 ft., Oriskany 5,281 ft., T.D. 5,351 ft.

Columbian Carbon Co. 1 W. L. Sayre, 442,000 cu. ft. gas, Corniferous 4,821 ft., Oriskany 4,924 ft., shot 4,929-69 ft., T.D. 5,022 ft.

Washington district: United Carbon Co. 9 (956) Elizabeth Ward Perkins, 2,317,000 cu. ft. gas, Corniferous 5,091 ft., Oriskany 5,212 ft., shot 5,217-50 ft., T.D. 5,281 ft., R.P. 1,780 lb.

DRILLING

Ravenswood district: United Fuel 5037 J. W. Clem, Corniferous 4,993 ft.

Ripley district: Godfrey L. Cabot, Inc., 1 W. A. Lee, Corniferous 5,030 ft.

Columbian Carbon Co. 2 E. F. Fisher, Corniferous 5,108 ft.

United Carbon Co. 931 G. L. Cabot, Corniferous 5,010 ft.

United Carbon Co. 956 Marshall Brown, Corniferous 4,854 ft.

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United Fuel Gas Co. 5037 J. W. Clem, Corniferous 4,993 ft.

Kanawha County

Poca district: United Carbon Co. 957 L. B. Jones, 1,929,000 cu. ft. gas before shot, Corniferous 4,841 ft., Oriskany 4,959 ft., drilling 4,997 ft.

South Penn 2 J. A. Wines, 1,400,000 cu. ft. gas, Salt sand, T.D. 1,171 ft.

DRILLING

Poca district: Godfrey L. Cabot, Inc., 17 Putnam Co., Corniferous 5,013 ft.

Putnam County

The final gage of the test of the West Virginia Gas Corp. on the P. R. and Frank Wilson farm in Union district was 3,901,000 cu. ft. of gas after shot. Before shot, it gaged only 391,000 cu. ft. of gas. Top of the Corniferous was placed at 4,994 ft.; Oriskany 5,089 ft.

Zenith Pool May Be Forerunner Of New Type of Kansas Trap

Although the big Zenith pool of Stafford County, Kansas, is now unique among oil fields of that state, John T. Paddleford, consulting geologist of Wichita, Kans., writing in the current issue of the Mines Magazine, published by the Alumni Association of the Colorado School of Mines, believes many more such oil traps may exist in the state. He urges that geologists and operators take this possibility into consideration in searching for new reserves.

The Zenith pool comprises Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 22, 23, 24 and 26, Township 24-11w, and 7-24-10w at its present stage of development. Up to May of this year it was producing from 254 wells and had a cumulative production of 4,609,024 bbl. Since that time another 45 wells have been completed in the pool and production has risen to 315,000 bbl. a month.

As yet it has not been defined in an east-west direction and, says Mr. Paddleford, "unquestionably the present eastern boundary is not yet its ultimate eastern extremity. Some dry holes to the northeast of the pool tend to substantiate the thought that the pool has possibilities of extending a considerable distance in that direction."

This summer and fall, developments at the Peace Creek pool in adjoining Reno County and northeast of Zenith have tended to support this theory and at the present time Simpson Oil Co. is preparing to test an outpost between the two pools which will at least give further evidence. (See p. 166.)

Zenith is located on a south plunging Arbuckle nose. It was discovered by Stanolind Oil & Gas Co. in September 1937 in NW SE 23-24-11w on the Mary Hartnett land. This test was completed in the Misener sand and was given an initial potential of 974 bbl. a day flow. Principal objective, now, however, are the Viola limestones, represented by a series of limes, dolomites and cherty dolomites, lying immediately below the Misener sand.

"Production," writes Mr. Paddleford, "is caused by a migration of oil from the southwest and being trapped in the Viola-Misener sections due to a pinchout of these beds to the north and to the extreme west.

"The Viola wedges out just west of the West Stafford pool, which is about 1½ miles west of the town of Stafford. The overlying Kinderhook shale forms the seal to stop migration into upper beds."

The article is a comprehensive study of the field and includes a series of cross-sections and maps giving a picture of the structure.

Mr. Paddleford refuses to estimate reserves in the pool on the grounds that "availability of information is not complete enough to place a definite figure on the recovery to be expected. Figures have been arrived at from as low as 3,000 bbl. per acre to 15,000 bbl. per acre. These calculations were based on core analysis in determining porosity, permeability and degree of saturation per foot of formation penetrated.

"The wide degree of variance in these calculated figures alone show the unimportance of these computations. Therefore, I believe that only the ultimate history of the pool will tell the story in regard to ultimate recoveries."

California Fields

(Continued from Page 182)

in the Rosecrans field and had reached the Wanda zone which was to be tested out. The crew was swabbing and then it happened. The pipe collapsed and snubbed the swab in the hole. This hole was never recovered and was finally abandoned after considerable work during which very little progress was made in reconditioning the hole. The earthquake in the Dominguez field is of special importance because it suggests that numerous pipe failures that have occurred in producing wells over a period of years may be due to earthquake slippages.

The most notable example of fault movement is in the Midway-Sunset field of Kern County where the Buena Vista fault, which is visible on the surface, is still moving. The result of this movement has been the premature abandonment of several wells. This is a thrust fault and of comparatively shallow movement so that its action can be overcome to some extent. The action is such that the upper segment has been moving southward over the segment south of the fault. Operators have been able to dig shafts around the casing down to a point below the moving mass so that when the north segment moves southward it does not disturb the casing. The moving segment varies in depth but approximately the upper 175 ft. is all that has been slipping. The movement has been going on for a number of years and recently the displacement has been measured at 1.75 in. per year.

Kansas-Oklahoma Combined Production Shows Gain

Combined daily average production for Kansas and Oklahoma fields during the week ended October 25 increased 2,900 bbl. over daily average runs during the preceding week. Kansas production was down from 259,800 bbl.—almost equal to maximum estimated pipe-line capacity—to 255,500 bbl., while Oklahoma runs were up from 418,250 to 425,450 bbl. Production by leading fields in the two states was as follows:

LEADING OKLAHOMA FIELDS

	Oct. 25	Oct. 18
Allen	4,150	4,050
Billings	6,300	6,250
Burbank	8,400	8,350
South Burbank	7,650	7,600
Balance Osage	17,900	17,700
Blackwell district	3,350	3,400
Bristow-Slick	6,350	6,400
Cement	12,200	12,250
Coyle	4,100	4,150
Crescent	1,425	1,450
East Cromwell	4,325	4,250
Cromwell	2,800	2,750
Cumberland	7,200	7,200
Cushing-Shamrock	8,750	8,800
Dill	2,400	2,500
Duncan	3,400	3,450
Edmond	3,175	3,250
Fish	4,025	4,050
Fitts	10,500	10,650
Jesse	1,950	1,975
Graham-Fox	2,050	2,075
Guthrie	3,350	3,300
Healdton	8,425	8,400
Hewitt	17,100	17,150
Keokuk	2,875	2,850
Konawa	975	925
Lucien	5,675	5,650
Moore	875	900
Northeastern counties	17,450	17,300
Oklahoma City	84,450	79,050
Olympic	1,625	1,500
Ramsey	4,650	4,675
Sasakwa	1,075	1,050
Sholem-Alechem	2,450	2,500
Stroud, East	1,875	1,800
Seminole district:		
Bowlegs	5,550	5,500
Carr City	2,125	2,100
Dora	1,150	1,100
Earlsboro	3,500	3,525
East Earlsboro	1,575	1,650
South Earlsboro	550	525
Little River	6,175	6,150
East Little River	600	625
Mission	1,200	1,175
Seminole	6,125	6,100
East Seminole	850	875
Searight	1,850	1,725
Total Seminole	31,250	28,050
St. Louis-Pearson	17,250	17,500
Tatums-Tussy	5,150	5,125
Wewoka	1,700	1,725
Yale-Jennings	3,400	3,300
Total Oklahoma	425,450	418,250

LEADING KANSAS FIELDS

	Oct. 25	Oct. 18
Augusta	1,250	1,300
Bemis-Shutts	10,850	11,150
Bloomer	6,150	6,350
Burnett	12,400	12,550
Burrton	7,500	7,300
Chase	6,850	7,100
Elbing	950	1,000
El Dorado-Towanda	7,000	6,950
Geneseo	7,250	7,450
Graber	3,050	3,000
Greenwood County	8,500	8,500
Hollow-Nikkel	1,350	1,400
Keesling-Midway	1,200	1,150
Lerado	450	300
Lorraine	1,450	1,400
Oxford	550	600
Rainbow Bend	900	900
Raymond	1,750	1,800
Ritz-Canton	3,700	3,800
Trapp	23,200	23,900
Balance Russell County	26,150	26,900
Sedgwick County	3,000	3,050
Silica	21,900	22,750
Voshell	1,700	1,650
Wellington	800	850
Wherry	2,550	2,750
Zenith	11,800	11,950
Others	81,300	82,000
Total Kansas	255,500	259,800

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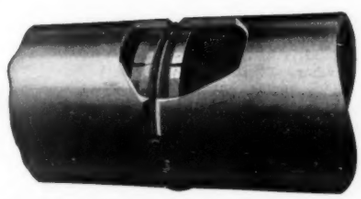

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MISSISSIPPI AND SOUTHEAST

Wilcox Production Proved In Warren County Test

By R. MARNE SANFORD

JACKSON, Miss., Oct. 27.—Mississippi's previously promising oil discovery in Warren County was somewhat of a disappointment over the past week end. It flowed an excess of water on initial tests and will be deepened in search of other oil-bearing sands in the large anticline on which it is located.

The test is Magnolia 1 Hall, NE NW NE 39-17n-4e (irregular), and 6 miles northeast of the city of Vicksburg. After the well had flowed approximately 6 hours the production was estimated at 10 bbl. hourly. However, further testing revealed salt water and after the well had flowed for several hours it was then set at 10 bbl. of oil and 1,000 bbl. of water daily. Deepening will start at once. Present depth of the test is 2,333 ft. and the oil sand is in the top of the Wilcox section where 38 ft. of saturation was cored.

The oil, when finally brought to the surface under its own pressure, showed to be of considerably higher gravity than was previously estimated. First set at 10° gravity oil, the true rating was about 16.8° gravity.

The wildcat topped the Wilcox zone at 2,195 ft., or about the level it is found in the Olla field of Central Louisiana. The normal dip of formations throughout the area of western Mississippi and Louisiana is to the southeast with the strike in a southwest-northeast direction. This would place the Warren County discovery about the same distance downdip from the outcrop as the Central Louisiana fields. Even in view of this fact, the Wilcox section has been topped in extreme southwestern Mississippi at such depths as would lead to the belief that as far north as Warren County the zone should not normally be found quite this high.

The Magnolia 1 Hall is definitely on a large dome with several hundred feet of closure. The well had checked several hundred feet high, structurally, since it was spudded. For this reason commercial production is expected at a deeper level. The projected depth of the wildcat was not revealed.

SUMMARY OF COMPLETIONS

Mississippi

	No.	Bbl.	Footage
Oil wells: Tinsley	6	3,201	37,703
Dry holes: Tinsley	2	.....	9,597
Total	8	.....	47,300

Alabama

	No.	Bbl.	Footage
Dry holes: Wildcats	2	.....	14,399

West Edge of Tinsley Defined

The west edge of the Tinsley field has been defined from the Woodruff zone by an edge test which was abandoned as dry the past week. It was Hassie Hunt 3 McMurtray, N½ SE 26-10n-3w, one location west of production at the operator's 2 McMurtray. The failure topped the chalk at 4,581 ft. and the Eutaw at 4,680 ft. with no Woodruff present. It was quit at a total depth of 4,702 ft. There is production farther west of this test at points both to the north and to the south. However, it appears that a small indenture in the western contour of the field has now been proven barren.

Tinsley Field Sets Another New Production Record

With drilling still steady in the Tinsley field it is little wonder that new production records are being set almost weekly in the field. However, for the past week a new all-time high was reached. There was a 2,000-bbl. daily gain over the previous week, making total daily production amount to 65,961 bbl. For the entire state the total daily production the past week was 66,436 bbl.

MISSISSIPPI COMPLETIONS

Fields

Tinsley, Yazoo County: Hassie Hunt 3 McMurtray, SW E¼ 26-10n-3w, top chalk 4,581 ft., no Woodruff present, Eutaw 4,680 ft., dry at 4,702 ft.

Hassie Hunt 3 G. Stutts, SW SE SE 30-10n-2w, Woodruff 4,980-5,000 ft., T.D. 5,000 ft., pumped 42 bbl. hourly.

W. B. Johnson and Texas Co. 3 Hennis, SE NW S½ SE NW 36-10n-3w, no Woodruff, T.D. 4,895 ft., dry.

M. Carl Jones 2 Walker, SW NE NW NE 2-9n-3w, Woodruff 4,935-58 ft., T.D. 4,958 ft., pumped 28 bbl. hourly.

Magnolia 2 Mitch Payne, NE SW 36-10n-3w, Woodruff 4,787-4,811 ft., T.D. 4,816 ft., pumped 325 bbl. daily.

Mid-States Oil 8 W. F. Cummings, NW NE SW SE 31-10n-2w, Woodruff 4,988-5,010 ft., T.D. 5,012 ft., pumped 476 bbl. daily.

Roeser & Pendleton 2 W. T. Stevens, NW SE 2-9n-3w, Woodruff 4,990-99 ft., pumped 27 bbl. hourly, T.D. 4,990 ft.

Snowden & McSweeney 3 Ben Hanley, NE S½ 35-10n-3w, Woodruff 4,903-21 ft., T.D. 4,927 ft., pumped 32 bbl. hourly.

MISSISSIPPI WILDCAT REPORT

Copiah County: Sun Oil 1 J. G. Ainsworth, N½ NW SE 17-9n-7e, 16-in. 90 ft., 10¾-in. 1,416 ft., top Vicksburg 1,220 ft., Moody 1,785 ft., Cockfield 1,815 ft., Cook Mountain 2,168 ft., Sparta 3,435 ft., Cane River 3,174 ft., Tallahatta 3,491 ft., Merichian sand 3,743 ft., Wilcox 3,790 ft., coring 6,204 ft.

Kemper County: Darrel C. Williams 1 McKelvain, SE NE 2-9n-17e, top Selma 724 ft., Eutaw 1,400 ft., Tuscaloosa 1,960 ft., show gas 2,175 ft., T.D. 3,172 ft., made electrical survey of hole and preparing run pipe for test.

Warren County: Magnolia 1 H. Hall, NE NW NE irregular 39-17n-4e, top Wilcox 2,195 ft., cored 2,192-2,202 ft., recovered 3 ft. oil sand, cored 2,202-12 ft., no recovery, D.S. test showed heavy black, low-gravity oil top Cane River 1,768 ft., Tallahatta 1,973 ft., 9⅝-in. 2,195 ft., flowed 10 bbl. oil, 16.8 gravity, and 1,000 bbl. water daily, will deepen.

Alabama Wildcat Is Dry Hole at New Record Depth

Probably the most closely watched wildcat ever drilled in the State of Alabama has been quit as a failure after drilling to a total depth of 12,399 ft. to set a new state record. The wildcat was Union Producing Co. 1 M. M. Waite, NW 27-8n-1w, Clarke County, on the Hatchitigbee anticline. It was drilled as a tight well and no geological information or horizon markers have yet been released.

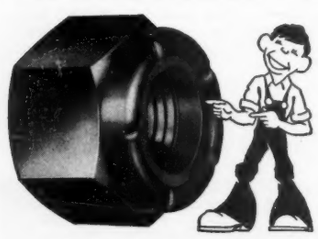
In Lauderdale County, G. F. Mercer abandoned 1 Patterson, SW NE NW 8-2s-12w, after topping the Trenton at 470 ft., the St. Peter at 1,410 ft. and the Knoxville at 1,611 ft. It was quit at a total depth of 2,000 ft.

ALABAMA COMPLETIONS

Wildcats

Clarke County: Union Prod. Co. 1 M. M. Waite, C NW 27-8n-1w, on Hatchitigbee anticline, est. top Pottsville 11,700 ft., est. top anhydrite 11,800 ft., dry at 12,399 ft., geological information not yet available.

Lauderdale County: G. F. Mercer 1 Neil C. Patterson, SW NE NW 8-2s-12w, Trenton 470 ft., St. Peter 1,410 ft., Knoxville 1,611 ft., dry at 2,000 ft., T.D.



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CANADIAN FIELDS

Turner Valley Trend to Be Tested to North and West

By VICTOR LAURISTON

CHATHAM, Ont., Oct. 27.—Crude and natural-gasoline production from all Alberta fields for the week ending October 13 averaged 27,199 bbl. daily compared with 27,925 bbl. daily for the previous week, and 25,560 bbl. daily for the corresponding week last year. The daily average included 26,340 bbl. of crude and 668 bbl. of natural gasoline from Turner Valley and 191 bbl. of crude from outside fields. The number of producing wells was 189, compared with 145 a year ago. The drilling summary showed: wells drilling, 25; finished, 3; testing, 9; suspended, 2; standing, 2; abandoned, 1; spudded, 2; drilling licenses issued, 4.

Two Large Producers

Major Oil Investments 2, LSD 12, 4-21-3w5, most northerly Turner Valley producer, which has been operating on a temporary allowable of 781 bbl. daily pending completion of tests, has been granted a new quota of 998 bbl., making it the largest crude producer in the field, and in Canada. Miracle Royalties 1, LSD 3, 4-21-3w5, previously on temporary allowable of 784 bbl., has been increased to 903 bbl., making it the second largest producer. All Turner Valley crude producers with allowables of more than 400 bbl., except two, are now concentrated in the north end of the field and indications point to a considerable extension of the producing area to the north, since Atlas-British Dominion 2, LSD 4, 17-21-3w5, the most northerly drilling well, 4½ miles north and somewhat west of Major 2, is logging normally, having encountered the grit-beds marker at 5,340 ft.

TURNER VALLEY LIME TESTS

North Turner Valley: Major Oils 3, LSD 1, 8-21-3w5, finished at 8,120 ft., Madison at 7,655 ft., preparing for production test.

West Central section: Okalta Oil 11, LSD 10, 24-19-3w5, T.D. 8,220 ft., Madison at 7,752 ft., acidizing and testing.

Alberta Pacific Royalties 1, LSD 14, 6-19-2w5, finished at 8,334 ft., Madison at 7,872 ft., testing production.

OUTSIDE FIELDS

Twin River: Western Drilling 1, LSD 16, 3-2-20w4, T.D. 3,869 ft., Madison at 3,845 ft., pumping 70 bbl. daily, some water intrusion below shale at bottom.

Steveville: Standard of British Columbia 2 Princess, LSD 3, 13-20-12w4, P.B. to 3,335 ft., making 130 bbl. daily with water down to 7 per cent.

Standard-McDougall Segur 1, LSD 3, 11-20-12w4, discontinued drilling in Devonian limestone below 4,034 ft., P.B. to Sunburst to test production.

Anaconda-Patricia 1, LSD 9, 31-20-12w4, oil shows in Banff shale between 3,663 and 3,717 ft., deepening to test Devonian limestone.

Vermilion: Princeville Petroleums 2, LSD 1, 31-50-5w4, finished drilling at 1,792 ft., testing production.

Sarcee Reserve Prospect

Arrangements are being made for resumption of drilling on Inland-Sarcee 1, LSD 2, 4-23-4w5, in the Sarcee Indian Reserve. Test has been standing at about 1,300 ft. Acreage is controlled by Highwood-Sarcee Oils of Calgary, which is negotiating for systematic testing of an extensive area extending south toward North Turner Valley. The area is north and west of the recent important North Turner Valley development, and in line with the general trend of the Turner Valley structure.

Michigan Fields

(Continued from Page 190)

Charles W. Teater 1 Hewitt Comm., N½ NW SW 32-18n-10w, 4,320 bbl., T.D. 3,575 ft.

Ohio Oil Co. 1 Auten Comm., N½ NE NW 29-18n-10w, 8,400 bbl., T.D. 3,523 ft.

Ohio Oil Co. 2 Auten Comm., S½ NE NW 29-18n-10w, 2,400 bbl., T.D. 3,549 ft.

Ohio Oil Co. 2 Baderschneider, N½ SW NE 30-18n-10w, 1,200 bbl., T.D. 3,623 ft.

Ohio Oil Co. 2 Gingrich, S½ NW SW 30-18n-10w, 2,496 bbl., T.D. 3,636 ft.

Ohio Oil Co. 1 Johnson, S½ NW NE 30-18n-10w, 960 bbl., T.D. 3,640 ft.

Ohio Oil Co. 1 Sitts, N½ NW SW 29-18n-10w, 2,172 bbl., after acid, T.D. 3,600 ft.

Van Buren County

Bloomingdale Township: Fisher-McCall Oil & Gas, Inc., 7-A Wiggins estate, SW SE SE 2-1s-14w, 35 bbl., after acid, T.D. 1,203 ft.

Fortney & Broughton 2 Reed, SW SE SE 2-1s-14w, 112 bbl., after acid, T.D. 1,294 ft.

Glen McCoun 1 Ampey, SE NW SE 2-1s-14w, dry, T.D. 1,385 ft.

H. C. Williams 1 Gelden, NW NW SW 12-1s-14w, 10 bbl., after acid, T.D. 1,298 ft.

The Paradox of Proration

(Continued from Page 12)

cates the annual total withdrawal of fluids from the reservoir should not exceed the equivalent of 4 to 6 per cent of the original total indicated recoverable oil content, unless or until it is definitely known that the natural or artificial maintenance of reservoir pressure will permit greater withdrawals without incipient waste. The optimum rate of withdrawal from such highly permeable sand reservoirs with an active water drive and with most of the gas in solution is obviously greater than that from dense sand or limestone reservoirs of low permeability with gas drive characteristics and with a typical gas cap. In case of reasonable doubt about the characteristics of the field it is better to err on the side of the lesser production rate rather than a greater rate, for the former will not result in any physical loss of oil recovery.

Concerning the proper rate of production of individual wells, valuable information on this subject may be gained by frequent determinations of the reservoir pressure buildup time after different rates of production. The time required to attain equilibrium pressure should be as low as possible consistent with the character of the reservoir, and the pressure through the reservoir should be uniform and maintained. A further check of the degree of deviation from the range of efficient production rates for wells may be obtained by plotting the productivity indexes, obtained at periodic intervals, against cumulative production. The degree of convexity in the decline of these indexes is indicative of the degree by which the proper rates have been exceeded.

If some national emergency should require that the waste tolerance be increased and the factor of ultimate recovery decreased then the same tolerance should as far as practicable be applied to all flowing or flush fields. Except for the institution of secondary recovery methods there is nothing to be done in the case of settled production fields, because the annual rate of recovery of the remaining reserves of such fields seems to be virtually equal to the ideal percentage depletion rate which hindsight indicates should have prevailed during the earlier years of the particular field's life. By the same token it may be said that the underground waste or sequestration of petroleum in a reservoir varies directly as the rate at which the first half of the recoverable reservoir content is produced and also as the first year's flush production. The importance of exercising proper control over production from the beginning is therefore manifest.

It may be said, therefore, that part of the approach to solving the conundrum of conservation may be made by the establishment of such conservative rates of reservoir withdrawal that not only are costs and wastes minimized and greater ultimate production obtained, to say nothing of the resulting economic stabilization, but a sufficient margin of safety is also provided to permit any necessary slight increases in production during years in which enough additional reserves have not been developed or made accessible for production to balance depletion. Furthermore, the arrangement should also permit a compensating decrease in withdrawals during years of currently excessive development, which are as unpredictable as they are necessary to offset the lean years.

Well Spacing and Development

The determination, within reasonable limits, of the proper rates of depletion for pools, states and districts, valuable though it may be, provides no more than half the answer to the conundrum of conservation. The rate at which petroleum reserves are discovered and developed, and the intensity of development, are fully as important as the rate at which the reserves are depleted, because the one is surely complementary to the others. During the past 10 years, one phase of this subject, well spacing, has been the subject of exhaustive study and research and much valuable knowledge has been gained thereby. Not the least important result of this study has been the gradually developed conclusion that well spacing is not so much a petroleum engineering problem as an economic problem. On the principle that more wells can always be drilled if justified but useless wells can never be undrilled, the present trend of well spacing is rightly directed toward initial wide spacing patterns providing for subsequent symmetrical or uniform interdrilling to such degree as the physical conditions in the particular case actually require.

The same principle may well be applied to the rate of wildcat and development drilling within the requirements of the situation. Two fundamental axioms govern the rate at which new reserves should be discovered and developed. They are:

1. The ability of a concern, state, or nation to stay in the oil business depends upon the continuous ability to discover new reserves at a rate at least equal to the rate at which known reserves are depleted.

2. Additional known reserves should be made accessible by drilling and development at a rate not less than the rate at which those previously accessible are depleted.

Now it so happens that the discovery of reserves and the development of reserves are interrelated projects. It is always hard to draw a line between where drilling to prove reserves ends and drilling to develop reserves begins. Were it not for this fact the yearly revision of reserve estimates would not be necessary. The magnitude of the reserve discovered by a successful wildcat cannot be reasonably evaluated in terms of current depletion until the areal limits of the pool are defined and sufficient production history is available to verify or modify the estimates made on the basis of formation analysis. With enough reserves proven it is fairly easy to plan a drilling program that will progressively make reserves available at the rate at which they are being depleted.

Status of Reserves

An important lesson learned by the petroleum industry of the United States during the previous World War is the absolute necessity of having adequate reserve oil-productive capacity so that the emergency demands of war will not require that the oil fields of the nation be produced at injurious or wasteful rates. This is a topic about which the war lords of the Reich could probably give fervent testimony.

With respect to the status of the known crude-oil reserves of the United States, the attached chart demonstrates the fact rather strikingly that contrary to popular belief, an overabundant known underground crude-oil reserve does not exist in the United States at this time. It shows clearly that the American petroleum industry must continue exploration and discovery activities with even greater intensity than in the past, in order

UNITED STATES PETROLEUM PRODUCTION AND PROVED RESERVES RATIOS, 1939-1940

(Thousands of barrels and per cent)

	Proved reserves Jan. 1, 1939*	Actual production 1939†	Per cent depletion rate—1939		Proved reserves Jan. 1, 1940*	Actual production 1940†	Per cent depletion rate—1940		Proved reserves Jan. 1, 1941*	Per cent of U. S.	
			Initial reserves	Remaining reserves			Initial reserves	Remaining reserves		1940 production	Jan. 1, 1940 reserves
Arkansas	188,246	21,143	11.23	6.60	320,148	25,583	7.99	8.35	306,218	1.89	1.61
California	3,188,763	224,354	7.04	6.35	3,532,342	223,881	6.33	6.80	3,291,382	16.55	17.31
Colorado	17,713	1,391	7.85	6.90	20,162	1,350	6.70	5.81	23,223	.10	.12
Illinois	242,847	94,302	38.87	24.72	381,636	146,788	38.47	46.55	315,305	10.86	1.62
Indiana	6,031	1,443	23.95	10.18	14,164	4,843	34.20	35.33	13,703	.36	.07
Kansas	613,230	60,725	9.91	8.37	725,467	66,270	9.27	9.58	692,088	4.90	3.64
Kentucky	37,545	5,581	14.87	12.67	44,086	5,193	11.78	12.66	40,999	.38	.21
Louisiana	1,040,256	93,869	9.02	8.00	1,173,225	103,961	8.88	8.54	1,215,459	7.68	6.40
Michigan	42,749	22,799	53.30	44.65	51,078	19,764	38.70	57.20	34,579	1.46	.18
Mississippi		103		1.55	6,642	4,380	65.95	10.88	40,242	.32	.21
Montana	104,471	5,961	5.71	6.38	93,460	6,768	7.24	7.57	89,443	.50	.48
Nebraska					50	251		6.68	3,749	.02	.02
New Mexico	703,252	37,323	5.31	5.43	687,168	39,001	5.68	5.63	692,141	2.89	3.64
New York	40,490	5,098	12.58	14.40	35,392	4,999	14.97	7.69	65,001	.37	.34
Ohio	26,358	3,156	11.97	9.97	31,692	3,169	10.00	10.46	30,284	.23	16
Oklahoma	1,162,370	160,072	13.82	13.81	1,063,152	155,952	14.65	15.55	1,001,909	11.54	5.27
Pennsylvania	200,460	17,337	8.64	9.46	183,123	17,353	9.46	9.23	187,647	1.28	.99
Texas	9,447,764	484,527	5.15	4.96	9,768,371	493,126	5.05	4.64	10,623,516	36.51	55.84
West Virginia	24,468	3,580	14.64	7.80	45,888	3,444	7.51	6.57	52,444	.26	.28
Wyoming	261,133	21,417	8.20	7.02	305,616	25,683	8.40	8.42	304,821	1.89	1.60
Other states‡		77			150	88	58.20	24.50	362	.01	.01
Total United States	17,348,146	1,264,256	7.29	6.84	18,483,012	1,351,847	7.31	7.10	19,024,515	100.00	100.00

*American Petroleum Institute estimate. †U. S. Bureau of Mines statistics. ‡Includes Missouri, Tennessee and Utah.

NOTE: When the percentage of initial reserves produced during a year is greater than the percentage of remaining reserves at the end of the year, adequate additions to reserves during the year are indicated and vice versa. The degree of equality between the percentage of the remaining reserves produced during 1 year and the percentage of the initial reserves produced the next year is an indication of the degree to which production is being stabilized on the basis of reserves as in the case of Pennsylvania. The extreme rate at which the oil resources of Illinois, Indiana and Michigan are being depleted is conspicuous, while the consistently efficient over-all depletion rate of Texas is notable with California, Colorado and New Mexico not far behind. The steady loss of relative position by those states producing more than the United States average percentage of their reserves is also significant. To produce on a reserve percentage parity at Texas efficiency the total United States reserves should be 29,100,000,000 bbl. or 53.3 per cent more than they are, while Illinois reserves should be 2,280,000,000 bbl. or 723 per cent more than they are to be on a reserve percentage parity with the 6.44 per cent average depletion rate of remaining reserves of the rest of the United States exclusive of Illinois.

to locate new oil fields and new supplies of oil, if the oil withdrawn from the known fields for current uses is to be offset and if a continuous and adequate supply of petroleum for national defense is to be maintained.

Plotted on the chart are the records since 1900 for the United States as a whole of: (*a*) The known underground reserves of crude oil as of the first of each year, (*b*) the average daily production, and (*c*) the indicated years' supply of crude oil represented by the known underground reserves, which is obtained by dividing the known underground reserves shown for the first of each year by the annual production of the preceding year. It should be understood that the known underground crude-oil reserves shown for any particular time represents the estimated-recoverable oil then remaining in the oil fields discovered or known up to that time. In other words, the reserve figures given for a specific date does not involve the reserves of those fields discovered or to be discovered subsequent to that date.

Reserves Behind Production Rate

Referring to the chart, it is seen that the known underground reserves of crude oil in the United States have increased considerably over past years, despite a more than 20-fold increase in production since the year 1900. Reserves have been increased from a level of between 2 to 4 billion barrels in the decade 1900-1910 to about 20 billion as of the first of 1941, while daily production has risen from just under 180,000 bbl. per day in 1900 to 3,665,000 bbl. in 1940. Production continues to mount rapidly, largely as a result of the national-defense activity, and according to recent reports it has exceeded the 4,000,000-bbl.-per-day mark. The U. S. Bureau of Mines estimate of the total demand for domestic crude-oil production for the month of October 1941 is 4,070,000 bbl. per day.

The most significant and important point to notice in examining the chart is that while the known underground reserves of crude oil have been greatly increased over past years, yet the increase in reserves has not kept pace with the phenomenal record of the rise in production and consumption. In other words, the measure of known reserves in terms of future supply has diminished substantially over the long term as a result of the tremendous increase in the demand for crude oil. This fact is revealed by the dashed line plotted on the chart and labeled "Indicated Years' Supply" which, as stated before, was obtained by dividing the known underground reserves on hand as of the first of each year by the annual production of the preceding year. It is seen that although only a relatively small reserve of crude oil was known at the first of the century, yet it was large in terms of the annual production at that time and constituted an indicated supply for from 30 to 40 years. As the demand for oil rapidly rose, the indicated years' supply trended downward sharply until the latter part of the decade 1920-1930, even though discoveries of new reserves exceeded production and substantial additions to known reserves were made. With the widespread application of improved scientific exploration technique and as a result of the discovery of several exceptionally large fields, known reserves rose rapidly following the year 1925 and outstripped the demand for oil, so that the indicated years' supply increased substantially from a low of about 11 years, as of the first of 1926, to 22 years for 1933. At that time, however, the trend reversed, and it has since been sharply downward, having reached a value of about 15 years as of the first of 1941. As a matter of fact new discoveries (not considering revisions and extensions in older fields) actually failed to balance production during the years 1939 and 1940 as may be seen in the chart. These circumstances are governed to a considerable extent by the intensity of development activity, but fundamentally they are simply the result of the cold fact that the discovery of prolific new fields is becoming increasingly difficult, despite continuously improved prospecting technique, as drilling gets deeper and as the more favorable possible oil-productive areas become more thoroughly tested.

Problem of Maintaining Reserves

The decidedly downward trend in indicated-years' supply of known underground crude-oil reserves since the year 1933 presents a rather disturbing condition when one considers the importance and necessity of insuring a continuous adequate supply of petroleum for national defense and industrial and civilian requirements. It is obvious that the downward trend cannot long persist and must be arrested if an adequate supply of domestic crude oil is to be maintained. In view of the substantially greater and greater demands for crude likely to result from defense activities, the position of known reserves in terms of indicated years' supply should in fact be improved. Even at this time some of the important producing areas of the country are being pressed to the limit to supply the local demand for oil. Many fields are being operated at excessive rates of production which lessens oil recovery and further diminishes the known recoverable reserve. To one who is not fully informed of the physical conditions surrounding the production of oil, the present known "indicated" 15-year supply may seem quite adequate. In this connection, however, it should be realized that the term "indicated years' supply" does not represent the actual number of years that the specified known reserve would be able to continue to supply the specified demand for crude oil. Actually, the productive capacity of any specified known reserve would soon fall below the demand as a result of depletion. In order to maintain productive capacity at the required level, depletion of known reserves must be offset by new discoveries, and a backlog of known underground crude-oil reserves must be maintained at all times that is consistent with the current and future demands for oil. Experience indicates that the known underground reserve on hand at any time should be equivalent to at least an indicated 20-year supply, in order to provide for efficient oil recovery and to insure a continued adequate supply.

The maintenance of adequate known underground reserves of crude oil requires that exploration and development operations proceed concurrently with production operations, for new oil fields cannot be discovered and developed overnight or at will, as the process is complicated and time-consuming. In the face of (1) a declining indicated years' supply of known reserves, (2) a likely ever-increasing demand for domestic crude as a result of the probable necessity of meeting, from the domestic supply, the defense, industrial, and civilian needs of other countries as well as of our own, and (3) an increasingly difficult discovery problem, it seems clear that oil exploration and development activity must be pressed with increasing intensity.

Oil discovery and development operations require a continuous flow of necessary material, supplies, and equipment to the petroleum industry. Because of the intensity of the defense activity this flow has been curtailed, and it seems likely that it will continue to be limited for some time in the future. This simply means that the American petroleum industry is faced with the formidable task of discovering, developing, and producing more and more oil with less and less equipment and supplies. Because of the urgent necessity of pressing with increasing intensity successful discovery operations, all supplies and equipment required for all such operations must be provided. However, all development and production operations must be carried on with the utmost economy and efficiency in the use of materials and equipment. The drilling and operation of wells unnecessary and in fact often detrimental to the efficient operation of any field, the unnecessary duplication of facilities of any kind, and the construction or use of any facilities unneeded or opposed to the most efficient operation of any gas, condensate, or oil field or combination thereof must be avoided. Such measures are necessary to insure the continuance of an adequate supply of petroleum and its products so vital to the national defense and the public welfare.

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Shell Completes Ventura Line

(Continued from Page 22)

The pump station at Ventura has four oil-pumping units, each powered by a 275-hp., 400-r.p.m. gas engine. It was constructed under contract by J. B. Gill, Inc., Long Beach, Calif.

No serious accidents occurred. At the peak of construction the contractor employed 650 men. They handled 438,000 ft. of pipe without a serious mishap.

In laying the line the contractor used modern equipment, much of it new. Huge bulldozers and graders were used to prepare the right-of-way. Other heavy equipment included side-boom tractors of the caterpillar type, ditching machines and compressors.

Special equipment to permit distributing pipe along the right-of-way in the mountain section was developed. With this equipment several joints of coated pipe were carried at one time on a heavy tractor to the most inaccessible portions of the line.

Seven construction crews working simultaneously on different sections of the line were supplied with arc-welding machines, jack hammers for breaking pavement along city streets, and miscellaneous lighter equipment.

Depending on the territory, each crew was able to lay from 500 to 8,000 ft. of line a day. The average daily run for all crews was about 8,400 ft.

Heavy boring equipment was used to force 16-in. casing under 54 separate highway and railroad crossings. Each required special attention to conform to the regulations prescribed by local governing authorities.

Three underwater crossings were made with the line. At the 2,700-ft. Santa Clara River crossing, near Saticoy, the pipe was buried 8 ft. to 24 ft. under the river channel. The river was diverted while installation was under way in the main channel. The line also passes under Calleguas and Ballona creeks.

Th crossing of Ballona Creek, which is over 300 ft. wide and several feet deep, was of special interest because the pipe for the entire crossing was welded in one continuous length on shore and then transported by means of four cranes operating on an adjacent highway bridge to the location where it was set in the trench several feet below the creek bottom.

About 5 miles of the new pipe line were laid under continuous pavement along the city streets of Los Angeles, Culver City and Santa Monica.

In the central and southern San Joaquin Valley, Shell owns 430 miles of 8, 10 and 12-in. main trunk lines, and 112 miles of 4, 6 and 8-in. gathering lines.

The new line increases Shell's pipe-line facilities in California to a total of 625 miles.

MARKET RECORD OF ACTIVE OIL STOCKS . . .

Compiled by Carl H. Pforzheimer & Co., 25 Broad Street, New York City, Member New York Stock Exchange and New York Curb Exchange

New York Stock Exchange

1941 High	1941 Low	Week ended Oct. 25 High	Week ended Oct. 25 Low	Week ended Oct. 25 Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1940	Com. sh. earn. 1940	Com. sh. earn. 1939	1940 High	1940 Low	1939 High	1939 Low
63½	44	57¾	55	57¾	Amerada Corp.	788,675	N.P.	50cQ	10-31-41	$2.00	$2.25	$1.56	58½	38½	74½	50
25½	19½	25½	23⅞	25¼	Atlantic Refining	2,663,999	$25	25cQ	9-15-41	1.00	2.11	1.66	27⅛	18¼	24¾	18⅛
13⅛	7	12⅝	11¼	11⅞	Barber Asphalt Co.	390,223	$10	25c	5-21-40	.50	—.48	1.39	16⅝	8½	21	10¼
10½	7⅝	10¼	9¼	10	Barnsdall Oil Co.	2,558,779	$5	15c	9-8-41	.60	.97	.76	13⅜	7⅛	19½	11⅛
6½	5¼	6¼	6	6⅛	Consolidated Oil Corp.	13,751,726	N.P.	12½cQ	11-15-41	.72½	.28	.55	8⅛	5½	9⅞	6½
26¾	17⅜	26	24	25¾	Continental Oil of Delaware	4,682,572	$5	25cQ	9-29-41	1.00	.92	1.35	25	16⅛	31½	19⅞
5	3½	4⅛	3¾	4	Houston Oil	1,098,618	$25	....	10-17-30	....	.30	.43	6⅞	3⅜	9⅜	4½
13⅜	9⅝	12½	12	12⅜	Lion Oil Refining	435,815	N.P.	25cQ	10-15-41	1.00	1.05	1.50	14⅜	9	18⅛	10
17⅞	13	17	15¾	17	Mid-Continent Petroleum	1,857,912	$10	40c	6-21-41	.80	1.60	1.42	17⅜	11½	18	11⅛
14⅜	9⅜	14⅛	12½	14	Mission Corporation	1,378,645	$10	60c	10-16-41	.25	1.01	.87	11¾	7⅛	14⅞	8¾
7⅞	4¼	6½	6⅛	6⅜	National Supply	1,155,517	$10	....	12-22-37	....	—.49	—.87	9¾	4⅝	15½	5⅝
10	6¾	9¼	8⅝	9¼	Ohio Oil Co.	6,563,377	N.P.	25c	6-14-41	.45	1.02	—.10	8¾	5⅜	10½	6
9¾	5½	8¼	7¼	8¼	Pacific Western Oil	1,000,000	N.P.	40c	12-19-39	....	—.21	.81	8⅞	5½	11⅞	7
10½	7¼	..	..	..	Pan American Pet. Trans.	4,702,945	$5	25c	12-21-40	.25	1.20	1.10	10½	6¾	8⅜	5
46	35¾	44⅞	43¾	44¾	Phillips Petroleum	4,449,052	N.P.	50cQ	8-30-41	2.00	2.60	2.21	41¾	27⅛	46½	31¼
17	14¼	16⅝	15⅝	16⅝	Plymouth Oil Co.	1,038,633	$5	30c	9-30-41	‡1.30	1.38	2.38	22¾	15	24	17⅛
10⅞	7	10⅞	10	10⅝	Pure Oil Co.	3,982,031	N.P.	25c	12-20-40	.25	1.21	1.11	11½	6¾	11⅜	6⅛
12⅛	7¼	10⅜	10¼	10¼	Richfield Oil Corp.	4,010,000	N.P.	50c	12-21-40	.50	.95	.65	9¼	5⅞	10¼	6⅝
17	12½	14⅝	14⅛	14½	Seaboard Oil of Delaware	1,244,383	N.P.	25cQ	9-15-41	1.00	1.05	1.40	20	11	24⅜	15½
15⅜	10⅛	15	13½	15	Shell Union Oil	13,070,625	N.P.	40c	7-21-41	.75	1.05	.77	13⅛	7⅝	17¼	9⅞
35⅛	18⅞	35⅛	33	35⅛	Skelly Oil	995,349	$15	50c	7-30-41	1.25	3.28	1.99	23¼	12¼	29½	15½
10⅜	8¼	10¼	9⅝	10	Socony-Vacuum	31,206,071	$15	25cSA	9-15-41	.50	1.17	1.10	12½	7⅛	15⅛	10¼
24⅝	17⅞	23¼	22⅛	23¼	Standard Oil of California	13,003,953	N.P.	35c†	9-15-41	1.00	1.73	1.38	26⅛	16¼	33⅝	24¾
34⅛	25½	32⅝	31¾	32⅝	Standard Oil (Indiana)	15,272,020	$25	50c†	9-15-41	1.50	2.20	2.23	29	20¾	30	33¾
45⅝	33	44	40⅝	43⅜	Standard Oil of New Jersey	27,280,998	$25	1.00†	6-16-41	1.75	4.54	3.26	46½	29⅞	53½	38
48½	34¼	41⅜	40	41	Standard Oil of Ohio	753,740	$25	75c†	9-15-41	2.00	7.44	6.64	41¾	26¼	32¾	17
60½	50	58⅜	55⅞	58	Sun Oil	2,434,863	N.P.	25cQ	9-15-41	*1.00	3.03	2.74	65⅞	46¾	66	45¾
2⅜	1⅜	1⅞	1¾	1⅞	Superior Oil Corp.	1,388,979	$1	10c	12-28-40	.10	.11	.04	2½	1⅛	3⅝	1¾
44¾	34½	44	40½	43⅞	Texas Corp.	10,876,139	$25	50cQ	10-1-41	2.00	2.90	3.02	47⅝	33	50⅜	32½
4⅛	2⅞	3⅛	3	3⅛	Texas Gulf Producing Co.	888,147	N.P.	10c	6-14-41	.20	.63	.69	4¼	2½	5¾	3¼
7¾	5¼	7	6⅛	7	Texas Pacific Coal & Oil	888,236	$10	10c	9-2-41	.40	.54	1.00	8⅝	5⅜	11⅜	7
11¼	9⅜	11⅜	10¼	11⅛	Tide Water Associated	6,371,827	$10	25c†	9-2-41	.70	1.14	1.05	12	8¾	14¼	9½
16	12¾	15	14⅝	14⅞	Union Oil Co. of California	4,666,270	$25	25c	11-10-41	1.00	.99	1.25	17½	17	19¾	15⅛
31	25	26¼	25⅝	25¾	Union Tank Car Co.	1,177,381	N.P.	50c	9-2-41	1.75	2.22	2.07	29⅞	22¾	24¼	20⅛
2⅜	1⅝	2⅛	2	2⅛	Wilcox Oil & Gas	470,768	$5	10c	2-15-40	....	.35	.77	3⅝	1¾	4¼	2⅜

*Also 5 per cent in stock. †Includes extras. Also 2 per cent in stock. —Deficit.

New York Curb Exchange

1941 High	1941 Low	Week ended Oct. 25 High	Week ended Oct. 25 Low	Week ended Oct. 25 Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1940	Com. sh. earn. 1940	Com. sh. earn. 1939	1940 High	1940 Low	1939 High	1939 Low
¾	¼	7¼	7	7¼	American Maracaibo Co.	1,778,415	$1	....	.....	....	—$0.04	—$0.05	‡‡	¼	1¼	¼
8¼	5⅛	2⅜	2	2⅛	American Republics Corp.	1,308,049	$10	10c	7-10-41	....	.78	.14	10¾	4½	11¾	5½
2½	1	..	..	..	Bridgeport Machine Co.	263,700	N.P.	$1.25	12-30-37	....	—.88	—.95	3¼	1⅜	7¼	2½
46	36½	..	..	..	Buckeye Pipe Line Co.	200,000	$50	$1	9-15-41	$4.00	5.09	3.13	43	28	34¾	26½
110¼	87	94	94	94	Chesebrough Mfg. Co.	120,000	$25	$1.50Q†	9-29-41	6.00	6.33	7.87	117	95	130	108⅝
6⅝	3⅝	4⅛	4	4⅛	Cities Service (new)	3,703,978	$10	....	6-1-32	....	1.72	.68	6¾	4	9¼	4¼
2	⅝	1⅜	1⅝	1⅜	Cosden Petroleum	465,804	$1	.....	.....	....	—.34	.15	2⅛	⅝	2¼	½
19¾	12½	18¼	17¼	18⅛	Creole Petroleum	6,974,356	$5	50cSA†	6-16-41	1.00	.98	1.38	24¼	11⅝	28	16¾
9	3¾	9	7¼	8⅞	Darby Petroleum	351,390	$5	25c	7-15-41	....	1.12	.03	4⅜	2⅞	7⅛	3⅝
2¼	1	1⅝	1½	1⅝	Derby Oil & Refining	263,162	N.P.	....	.....	....	.12	—.37	2	¾	2⅝	1½
28¾	21¼	20½	20	20½	Eureka Pipe Line	50,000	$50	50c	11-1-41	2.25	—.49	.63	31	20¼	23	15⅛
39	29	36	34½	35⅞	Gulf Oil Corp.	9,076,202	$25	25cQ	10-1-41	1.25	2.44	1.69	39⅞	25⅛	45⅛	29¼
65	52¾	61½	59	61⅜	Humble Oil & Refining	8,987,840	N.P.	62½c	10-1-41	2.00	3.13	3.33	68	47⅛	71	42½
7⅜	5¾	7⅛	6⅞	7⅛	Imperial Oil of Canada	26,965,078	N.P.	25c	6-2-41	.62½	.65	.71	12⅜	5⅜	17	11⅜
5	2¾	3⅞	3¾	3⅞	Indiana Pipe Line	300,000	$7.50	20c	11-15-40	*2.80	.09	.33	7¾	3	7¼	5½
11⅞	8⅞	11½	11	11¼	International Petroleum	14,324,088	N.P.	50c	6-2-41	1.25	.94	1.19	10¾	8¼	27½	17
2⅝	1¾	2	1⅞	2	Kirby Petroleum Co.	500,000	$1	10c	3-15-41	....	.16	.06	2¾	1⅝	3¾	2⅛
10⅛	8⅜	8⅝	8½	8½	Lone Star Gas	5,518,347	N.P.	20c	8-22-41	.70	1.17	.98	10¾	7⅝	10½	7⅛
5⅝	4⅛	4⅝	4½	4⅝	Louisiana Land & Exp.	2,966,762	$1	10c	9-15-41	.35	.29	.22	6¼	3¾	7¾	4
10	9½	..	..	..	Margay Oil Corp.	149,943	N.P.	25cQ	10-10-41	1.00	1.02	1.52	17	9¼	17	14½
4⅛	2½	3⅝	3⅜	3⅜	Middle States Petroleum "A"	291,970	$1	37c	1-31-41	.63	.31	.37	4⅛	2¾	5¾	2¾
8	7	7⅝	7¼	7⅝	Midwest Oil Co.	998,474	$10	45c	6-16-41	.90	.88	.99	8½	5½	8¾	6⅝
6⅛	5⅛	5½	5¼	5½	Mountain Producers	1,593,584	$10	30cSA	6-16-41	.60	.58	.70	6¼	4⅞	6	4⅞
12⅜	10⅛	10⅜	10½	10¾	National Fuel Gas	3,810,183	N.P.	25cQ	10-15-41	1.00	1.12	.95	13⅛	10	14	11¼
12⅞	10¼	11¾	11⅜	11¾	National Transit	509,000	$12.50	50c	6-16-41	1.00	1.08	.91	12½	8¾	9½	7¼
2¼	1	..	..	..	New Mexico and Arizona	1,000,000	$1	1c	12-1-37	....	.03	.02	1¼	¾	1¾	1
8¼	6⅝	..	..	..	New York Transit	100,000	$5	30c	10-15-41	.60	.91	.88	7¾	5¼	6	4
9¾	7¾	9¾	9⅝	9⅝	Northern Pipe Line	120,000	$10	50c	6-2-41	.80	.70	.31	9⅞	6	7	4½
5⅜	2⅝	5¼	4⅝	5	Pantepec Oil	2,856,872	$1	....	.....	....	.02	....	5½	2½	7⅝	4
3¾	1	2⅞	2¾	2¾	Root Petroleum Co.	336,045	$1	25c	2-1-37	....	.04	.70	3¼	1	5	1¼
2⅝	2⅛	2½	2½	2½	Ryan Consolidated	298,931	N.P.	10c	12-28-40	....	.43	.16	3	1¼	3	1⅞
8	6½	7¼	7¼	7¼	Southern Pipe Line	100,000	$10	25c	9-2-41	.50	.81	.25	11¾	4¾	4⅞	3½
43½	35⅝	37	36	37	South Penn Oil	1,000,000	$25	37½c	9-26-41	2.50	2.10	2.84	44	28	40½	26¾
30½	23	25	25	25	Southwest Penna. Pipe Lines	35,000	$50	50c	10-1-41	6.50	3.22	2.06	35	21	23	18
20⅜	17⅞	19⅜	19¼	19⅜	Standard Oil of Kentucky	2,604,790	$10	25c	9-15-41	1.30	1.47	1.53	20⅞	16½	20⅛	17¼
2¼	1⅜	2¼	2	2¼	Sunray Oil	1,975,876	$1	5c	12-20-40	.10	.23	.25	2	1⅜	2¾	1¾
3¼	2⅝	2⅞	2⅞	2⅞	Texon Oil & Land	936,024	$2	10c	9-26-41	.40	.45	.49	3⅛	2	4	2⅝
4⅝	2¼	4¼	4	4¼	Transwestern Oil Co.	750,000	$10	....	.....	....	—.59	—1.42	3⅜	2	6	2½
‡‡	½	⅞	½	½	United Gas Corp.	7,818,959	$1	....	.....	....	—.49	—.55	2⅛	¾	3⅜	1½

*Includes $2.50 capital distribution. †Includes extras. —Deficit.

Personal Paragraphs

HERBERT GREENFIELD was elected president of the Alberta Petroleum Association at a recent meeting of that body. Other officers elected were: F. M. GRAHAM, vice president; E. W. KOLB, secretary-treasurer.

E. E. PYLES, production chairman of District 5; L. L. AUBERT, chairman of the subcommittee that worked out a curtailment program at the request of the coordinator, and F. S. BRYANT, a member of the subcommittee, left early this week for Washington, D. C., to discuss details of the new plan with the office of the coordinator.

C. W. ARMSTRONG, field engineer for Humble Oil & Refining Co., has been appointed district petroleum engineer of the Conroe, Tex., district.

HAYLETT O'NEILL, JR., associate enginer in the Houston, Tex., office of Humble Oil & Refining Co., has been appointed district petroleum engineer for the Magnet district.

HENRY M. KRAUSE, JR., field engineer for Humble Oil & Refining Co., has been appointed district petroleum engineer in the Pyote district.

C. C. DILLEY, Benzoco Co., Akron, Ohio, was elected to fill the unexpired term of RALPH E. BRIGGS, Cleveland, Ohio, on the board of directors of the Pennsylvania Grade Crude Oil Association.

LYNDON L. FOLEY, petroleum engineer, will discuss proration and well spacing at this week's meeting of the Petroleum Accountant's Society of Oklahoma, at Tulsa. The meeting will be held Thursday, October 30.

T. B. SUDDERTH has resigned as vice president and general manager of Eunice Gas Co., Hobbs, N. M. DWIGHT P. TEED, secretary, has been elected to the board of directors, and B. W. JARBOE has been appointed general field superintendent.

Dr. HARRY H. POWER, professor of petroleum engineering at University of Texas, and for some years chief engineer at Tulsa for Gulf Oil Corp., has been appointed adviser to the oil-conservation branch of the defense oil coordination program. He will be associated with E. De GOLYER, conservation director.

R. E. CLEMENTS, Amarillo, Tex., has been elected president of the newly organized Liquefied Gas Association, which embraces the liquefied-gas industry of the Texas Panhandle, New Mexico, Oklahoma, Kansas, and Colorado. The purposes of the organization are to promote safety and to make a bid for priorities in steel.

ARTHUR F. CORWIN, vice president and member of the executive committee of Socony-Vacuum Oil Co., Inc., was principal speaker at the twenty-first anniversary celebration of the company's Twenty-Year Club at New York City last week.

D. B. HARRIS, Houston, Tex., director of personnel relations of Humble Oil & Refining Co., was opening speaker at the Texas Personnel Conference held last week at University of Texas.

H. S. COLE, JR., division manager for the Texas Co. at Fort Worth, Tex., is slated to be moved to Houston, where he will be assistant to L. E. BARROWS, manager of the producing division of the Texas Co. C. B. WILLIAMS, formerly assistant in the office at Fort Worth before having been transferred to South America where he was in charge of the Barco operations for 3 years, has returned to Fort Worth and will be division manager, succeeding Mr. Cole.

E. V. S. "VAN" LOWEREE, district scout at Enid for Pure Oil Co., has been elected president of the Oklahoma Oil Scouts Association. FRED JACKSON, chief scout for Phillips Petroleum Co., is the new first vice president, and HOWELL DOUGLASS, Magnolia Petroleum Co., is secretary-treasurer. MILTON BARRETT, Ohio Oil Co., at Edmund, was elected chairman of the executive committee, and LEE A. ADAMS, Sinclair Prairie Oil Co., Oklahoma, was made chairman of the board of directors and thereby becomes the Oklahoma representative on the board of the National Oil Scouts of America.

Do You Remember?

From The Oil and Gas Journal Files

25 YEARS AGO

The town of Goose Creek, Tex., has been ordered to move from its present location by Mrs. Anna Schilling, owner of the townsite. Mrs. Schilling has leased the property to C. T. Rucker for oil development and Mr. Rucker is ready to drill.

A. R. Bergsten, 33 superintendent of the Midway (Calif.) Gasoline Co., lost his life October 24 by drowning. He was hunting ducks and slipped into a slough.

The statement by Van H. Manning, director of the U. S. Bureau of Mines, that the supply of crude oil in the United States would be consumed in from 25 to 30 years was characterized by Denver government officials as "ridiculous."

20 YEARS AGO

The sales manager's berth of the Producers & Refiners Corp. that has been vacant since the tragic death some months ago of W. F. Kistler, has been filled with the appointment of Albert E. J. Landsittel.

The Mexican oil situation apparently is being clarified.

A total of 145 oil tankers were idle on October 1 because of lack of business.

Japan is seeking oil concessions in Mexico, . . . not to supply fuel for its oil-burning warships, but to light lamps in more than 10,000,000 Japanese homes, according to reports.

10 YEARS AGO

E. B. Reeser, president of the Barnsdall Corp. and of the American Petroleum Institute, is seriously considering an urgent request from the oil industry in California that he become director general and arbiter of the industry in that state.

William H. Gray, well-known oil man and former practicing attorney, died of pneumonia in a Tulsa hospital October 22. He was 54 years of age.

FLOYD M. STEPHENSON, formerly equipment engineer with Phillips Petroleum Co. at Bartlesville, Okla., has been transferred to the division office at Oklahoma City. He is moving there with his family.

E. H. MOORE, Tulsa oil man, was appointed to the Santa Claus commission last Saturday by Gov. Leon C. Phillips. He will serve with ERLE P. HALLIBURTON, Duncan, Okla., and J. E. MABEE, Tulsa.

SAM GREENIDGE, Texas Pacific Coal & Oil Co., will succeed JOHN WILMOT, Texas Co., as executive vice president in the Petroleum Engineers Club, Fort Worth, Tex. Mr. Wilmot has been transferred to Wichita Falls, Tex.

J. A. BRANDT, Atlantic Refining Co., Tulsa, was leader of an inspection trip made by between 100 and 200 geologists last Saturday. The geologists inspected the area around Choteau, Okla., where the Government is constructing a large powder plant.

C. D. TAYLOR, purchasing agent of Barnsdall Oil Co., Tulsa, has been named chairman of the nominating committee for the Purchasing Agents Association of Tulsa. His aides are M. F. BRIDGES, Tide Water Associated Oil Co., and W. H. BARCLAY, Darby Petroleum Corp. Election will be held December 9.

S. M. WOLBERT, plant engineer for Kendall Refining Co., Bradford, Pa., was in charge of the fire-fighting demonstration and presided at the afternoon session of the semi-annual meeting of the Department of Fire and Accident Prevention of the National Petroleum Association at Bradford last week.

G. J. LEE, tank-car sales manager for Mid-Continent Petroleum Corp., Waterloo, Iowa, was a recent visitor at the Tulsa office of the company.

D. F. McMAHON, JR., formerly an assistant in the scouting office in Tulsa of the Texas Co., is now in the land department of Stanolind Oil & Gas Co.

CLAUD B. HAMIL, independent producer of Houston, Tex., has been appointed congressional and county chairman for Harris County for the defense savings staff of Texas.

S. E. FURMAN, superintendent in the Southern California area for Ohio Oil Co., has been temporarily assigned to the Michigan district because of additional drilling under way there.

W. W. BRUCE, for 32 years superintendent in the Chandler, Okla., district for Oklahoma Natural Gas Co., has retired. He has been honored at a series of parties, one in Oklahoma City and another in Chandler.

MRS. A. J. SCOTT, Vancouver, B. C., formerly secretary-treasurer of Anaconda Oil Co., Calgary, has been called up for active service as a lieutenant of the Canadian Women's Training Corps.

HANCE H. CLELAND, former executive head of the California-Oregon Power Co., has been named president of the San Diego Gas & Electric Co., succeeding W. F. RABER, who resigned.

E. W. McALLISTER, engineer for Western Gulf Oil Co. in the San Joaquin Valley, discussed the Paloma field, California's first condensate field, before the San Joaquin Valley chapter of the American Petroleum Institute at Bakersfield.

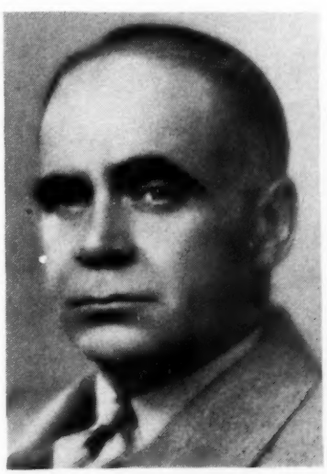
FRANK E. RUBEN, secretary-treasurer of the newly formed Paragon Oils, Ltd., has left his California offices to go to the company's headquarters at Lethbridge, Alta., in order to make preparations for a spring drilling campaign. The Paragon concern was organized to develop leases owned by MYRON ZANDMER and Mr. Ruben, which were formerly included in the properties of Western Drilling Co., Ltd. Mr. Zandmer, of Los Angeles, Calif., is president of the new Canadian firm.

New Vice Presidents

James Tanham and Torrey H. Webb, last month became vice presidents of the Texas Corp. Mr. Tanham, formerly assistant to the president of the Texas Co., who was also elected vice president of the Texas Co., was born in Brooklyn, N. Y., August 10, 1895, and was educated in New York City. His first employment was with an optical company, and he entered the service of the Texas Co., May 26, 1919, as a stenographer in the executive offices in New York. Five years later he was made senior clerk in the executive offices, and on June 1, 1926, became executive assistant in the general domestic sales department. He was made assistant to the vice president in charge of domestic sales on November 27, 1928, and 4½ years later was made assistant to the president.

JAMES TANHAM

Mr. Webb was born December 7, 1892, in Gazelle, Calif. He attended Cambridge Latin School and Phillips Exeter Academy and in 1917 was graduated from Columbia University School of Mines. He prospected for oil in Texas following his formal education and later became interested in land development in California. In 1922 he went to the Ventura Consolidated Oilfields as a statistician. He became an engineer for California Petroleum Corp. in May 1926, and 2 years later was made assistant to the vice president of its successor company, the Texas Co. (California). In February 1929 he became chief of the land and lease department of that company, and in July 1931 was advanced to the post of assistant to the vice president and general manager. In 1937 he became assistant to the president and general manager, and in August 1938 was made vice president and general manager.



TORREY H. WEBB

W. H. GIBSON, McColl-Frontenac Oil Co., recently addressed the Engineering Institute of Canada at Calgary, Alta., on geophysical prospecting for oil.

FRED BELEAU, field superintendent at Jennings, La., for Stanolind Oil & Gas Co., has been made district superintendent with offices in Houston, Tex.

ROBERT E. DUNHAM, formerly with Sinclair as a member of the engineering staff, has joined Harry R. Lewis Co., Warren, Pa., as chief research consultant.

W. M. GRIFFITH, vice president and general manager of Plymouth Oil Co., Sinton, Tex., was expected to return from Dallas, Tex., where he has been confined to the hospital following a brief illness.

A. L. MOORE, formerly district construction foreman in the North Crowley district, Louisiana, for Humble Oil & Refining Co., has been transferred to the Louisiana division at New Orleans as division construction foreman.

MAJ. L. A. BEECHERL, of McDaniel & Beecherl Drilling Co., Dallas, Tex., has returned to his office after completing his tour of duty with the 112th Cavalry, 56th Cavalry Brigade, at Fort Bliss and Fort Clark, Texas.

WILLIAM J. PFIFFNER, independent operator of Houston, Tex., was elected vice president of the National Conference of Catholic Charities for 1942 at the closing session of the conference held in Houston the past week.

O. H. CREWS, who worked at Oklahoma City, Okla., with British American Oil Co. while completing his petroleum engineering work at Oklahoma University, left New Orleans October 21 to sail for Talara, Peru, to join International Petroleum Corp.

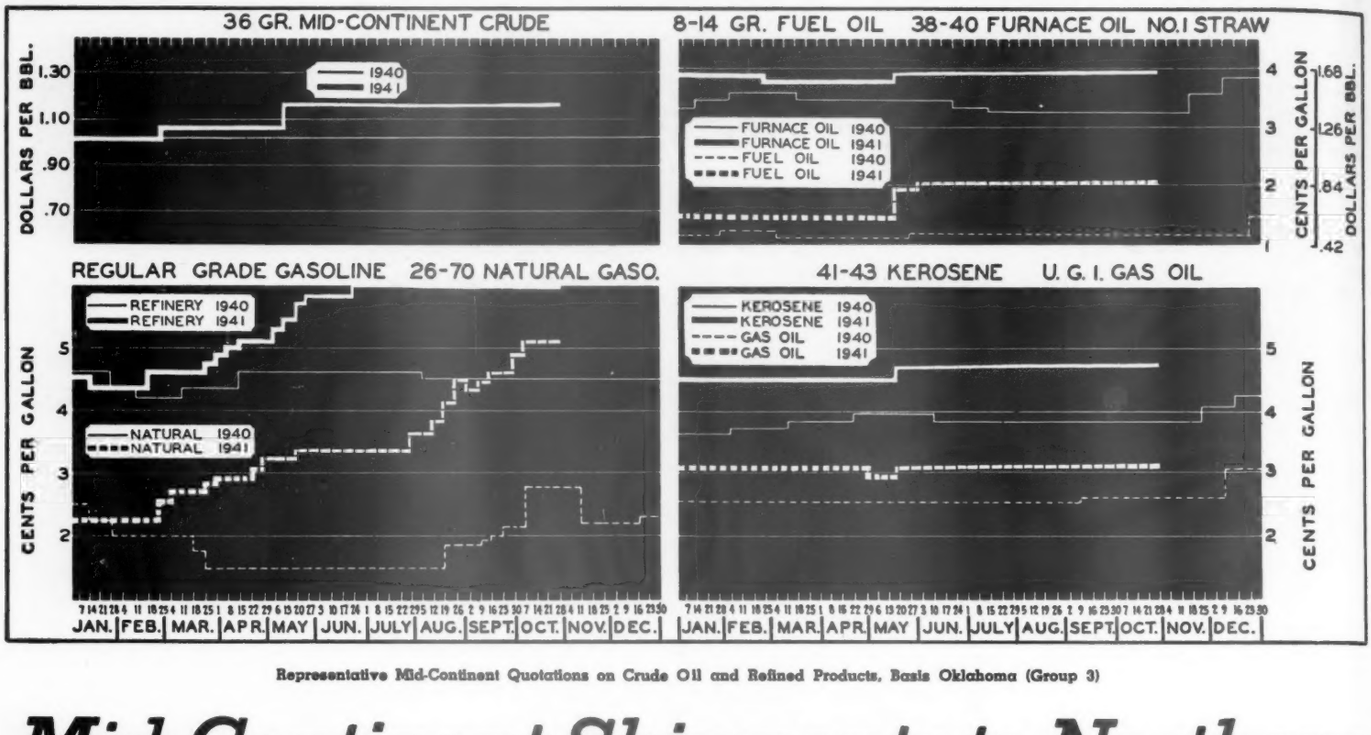
CARL BEAL, California petroleum geologist, invited all alumni of the departments of geology and mining engineering at Stanford University to Rancho Sierra Vista, his estate near Ventura, for an Argentine asado (sheep barbecue). Many faculty members from the department attended the asado.

ROLAND M. ALSBROOK, Lone Star draftsman, has made a hobby of collecting old sheet music. After 4 years of search he now has gathered nearly 1,500 original copies of sheet music popular around the turn of the century, much of which has been out of print for years.

W. R. S. JONES, Arkansas Fuel Oil Co., delivered a paper on "Cementing and Completion Problems in the Olla Field," at the first meeting of the fall session of the Ark-La-Tex chapter of the American Petroleum Institute at Shreveport, La., Tuesday night, October 28. B. J. DOWD, Union Producing Co., delivered a paper on "Disposition and Removal of Salt From Oil Wells."

EARL B. NOBLE, chief geologist of Union Oil Co., with offices at the headquarters of the company in Los Angeles, Calif., cracked up on a flight in Costa Rica several days ago but escaped with minor injuries. Very little information has come through but it is assumed that the airplane made a forced landing as the ship and passengers were missing over 24 hours before being found.

WILLIAM K. WHITEFORD, executive vice president, British American Oil Producing Co., Tulsa, will go to the Toronto, Ont., offices of the company shortly after the first of the year for an indefinite tour of duty, remaining there 6 months or a year, and possibly longer. During his absence, H. C. ARNOLD, vice president at Tulsa, will be in charge of the Tulsa offices and the company's operations in the United States. Mr. Whiteford joined British American in 1933, after resigning as vice president and general manager of Barnsdall Oil Co.



Representative Mid-Continent Quotations on Crude Oil and Refined Products, Basis Oklahoma (Group 3)

Mid-Continent Shipments to Northern Buyers Above Refiners' Expectations

By H. STANLEY NORMAN

MOVEMENT of motor fuel from the Mid-Continent refining centers to northern consuming states is continuing at levels exceeding expectations of operators but heavy rains in this part of the country in recent weeks caused a sharp reduction in local deliveries.

Numerous highways in the Mid-Continent territory have been inundated and impassable for 1 to 2 weeks, creating a dual reaction on local markets. In the first place, consumption has dropped considerably below normal because of the inability to use automobiles in routine travel. Furthermore, tank-wagon distributors have been unable to make regular calls at the refineries of suppliers

Most Mid-Continent refiners welcomed the "breathing spell" on local deliveries resulting from inundated highways. Otherwise, several reported, stocks would have been drawn below the margin of safety that most refiners attempt to maintain as protection against unpredictable interruptions in plant operation.

Northern Buyers Active

There is no indication that the call for shipments from northern buyers will be reduced, although this is the season when weather changes may be expected and when any radical change is reflected most promptly on shipping instructions. Return of American tankers to the East Coast service appears certain to have registered an indirect influence on the Mid-Continent market. Reports were circulated this week that 200 tank cars of "Q" gasoline were shipped from East Texas to the Gulf Coast, the first time in months that such traffic has been more than a few tank cars per week. Details of the circumstances involved in the East Texas shipments to the coast were not available but the main facts dovetailed with conditions existing on the gulf.

Reversal of the normal flow of gasoline from East Texas to southern terminals in contrast to northern movement in recent months may tend to expand the call on Mid-Continent refineries. East Texas enjoys the most favorable freight rate on gasoline shipments to the Gulf Coast of any inland refining district. If coastal plants are forced to augment their own production from inland refining sources, East Texas is the most logical base of supplies from which to draw. The freight rate from East Texas to the Gulf Coast on gasoline is approximately 36 cents per barrel.

During the period tankers were insufficient to meet requirements of the East Coast district, Gulf Coast refiners were forced to store large quantities of motor fuel and East Texas plant operators were compelled to sell their production in the Missouri Valley and Middle West districts in competition with Mid-Continent products, involving a freight disadvantage.

Another reason behind the movement of East Texas gasoline to the Gulf Coast may be the greater volume of business accruing to coastal suppliers under provisions of the Lend-Lease Act.

Refined Oil Market Barometer

Elimination of restrictions on the East Coast refinery market, while local in its immediate application, has an indirect bearing on practically all products in the country. One important market development is resumption of movement of East Texas gasoline to the Gulf Coast, taking the pressure of that material from the Mid-Continent sales territory. Production of Gulf Coast refiners is not sufficient to meet lend-lease and civilian requirements without outside help.

MID-CONTINENT. Local consumption curbed by inclement weather.

GULF COAST: Lend-lease gasoline prices higher than domestic ceiling.

CALIFORNIA: Fuel oil continues strong. General market quiet and inactive.

PENNSYLVANIA: Demand strong for all products. Interdistrict shipments resumed.

CHICAGO: Sales of gasoline and fuel oil at high level. Prices unchanged.

Prices Firm and Unchanged

Prices on Mid-Continent motor fuel are firm and steady at unchanged levels. There is general agreement among refiners that prices will remain static until crude producers and purchasers have settled the question of an advance in postings with the Office of Price Administration. Data are being collected from Mid-Continent producers to show the increase in operating costs and the relationship of higher prices to the rate of well completions.

Prices on other refinery products are holding firm with gasoline, although most operators anticipate that distillate-fuel quotations will move into higher brackets as soon as colder weather in the northern states intensifies the activity of buyers. Fuel-oil purchasers have been resisting strength of the burning-oil market, chiefly because the consumer demand has not reached winter proportions. Kerosene and No. 2 fuel oil, however, are more actively sought than earlier this month and those refiners who are declining to offer on current quotations feel certain that higher bids will appear in the market before much of November passes.

Natural gasoline remains one of the strongest products in the Mid-Continent. Production is lagging substantially behind demand. The price of 5.125 cents per gallon in Group 3 territory and 4.75 cents in North Texas for 26-70 material is about 3 cents higher than a year ago.

Eastern Refinery Market Freed Of OPC and OPM Restrictions

By J. P. O'DONNELL

NEW YORK, Oct. 28.—The lifting of all restrictions on gasoline sales in the East Coast territory and the announcement that 40 oil tankers previously diverted to British use would be returned to the Gulf-Atlantic seaboard trade, highlighted the refined-oil markets in this area. The order was unexpected and took the oil trade almost completely by surprise, inasmuch as the belief held by many oil men that a shortage of oil no longer existed in this area because of the numerous steps adopted by the oil industry to offset the loss of between 80 and 100 tankers, they had understood that the coordinator was maintaining the position that the shortage existed, right up to the time of the announcement.

Mr. Ickes also announced that gasoline service stations would no longer be requested to close down at any time, thus lifting the daily 7 p.m. to 7 a.m. closing order. Numerous stations immediately resumed sale of gasoline after 7 p.m., but a great many operators have indicated that they will continue the closings for a time. It is now generally admitted that the rank and file of service-station operators were in favor of the nightly closings, because they experienced lower lighting and labor costs without much, if any, decrease in sales. However, with some stations open, it will probably be impractical for many to close down without losing a certain amount of business to those which remain open. Efforts are being made by some of the East Coast gasoline trade associations to promote a plan for all stations to agree to close, but many are doubtful about the outcome of the movement. Another question being asked by motorists is whether gasoline stations will now continue to maintain the retail gasoline-price increases, ranging from 1 to 2 cents a gallon, which went into effect early in August, when the nightly closings were inaugurated.

The lifting of the oil-sales restrictions in this territory did not appear to have had any immediate effect on the price structure. Of the 40 tankers to be returned to this trade, only 5 or 6 have yet actually been restored to the oil companies, it is reported. Gasoline and heating oils have continued firm in price. While the consumption of gasoline is well above the level of a year ago, due to mild weather, for the same reason the consumption of heating oils has been subnormal. Suppliers of burning oils, however, expect demand later on will make up at least to some extent for the present lag, inasmuch as there are estimated to be some 200,000 more oil burners in use this winter than a year ago, of which 125,000 to 150,000 are in the Atlantic seaboard area.

While the ending of restrictions has not yet affected prices, the urgent buying of many products based on expectations of a growing shortage, has slackened off considerably, reflecting the improved inventory position in this area, and this may sooner or later, it is felt, be reflected in the spot market, especially for gasoline. It is also believed likely that retail-service-station operators will be subjected to more normal competitive conditions now that a free flow of supplies is assured. Under the restrictive orders, an operator could not afford to boost his sales by cutting prices below those of his competitors, for he would sooner or later run out of supplies and could not obtain additional quantities until the following month.

So great had the improvement in the supply situation in the East Coast area become that many oil men had anticipated a lessening of restrictions for November, but few looked forward to a complete lifting of the curtailment order.

American Petroleum Institute statistics for the week ended October 18 revealed a sharp increase in Atlantic Coast refinery and bulk-terminal inventories of gasoline and fuel oil. The total increase in gasoline, distillate fuel oil, and residual fuel oil was 2,615,000 bbl., of which gasoline accounted for 1,172,000 bbl., light fuel oil 794,000 bbl., and residual fuel oil 649,000 bbl.

Inventories of both gasoline and light fuel oils, according to the A.P.I. report, are larger than those on October 30, 1940, as reported by the Bureau of Mines. The increase in gasoline stocks amounts to 812,000 bbl. and that in light fuel-oil stocks is 2,184,000 bbl.

Oil executives here point out that there still is a tanker shortage, and that maintenance of ample supplies in the East Coast area during the winter will depend on continuance of emergency measures now in force, as well as no further withdrawals of tankers from the East Coast trade. The fact that Great Britain has been able to return some of those originally diverted is encouraging, however, and the completion of new tankers building in Atlantic Coast yards gives further basis for optimism regarding the supply situation through the 1941-42 season.

The only product over which some concern is still visible is residual fuel oil. Inventories of this product as of October 18 were 1,942,000 bbl. less than those prevailing on October 30 last year, and inasmuch as inventories in the Southwest are also relatively low, there appears little chance of replenishing these Atlantic seaboard stocks unless by larger imports. Prospects for sharply increased naval requirements for bunker fuel oil add to the situation.

The improved supply situation affecting gasoline and distillate fuel oil on the East Coast has

(Continued on Next Page)

Gulf Refiners Strive to Fill Lend-Lease Demands

HOUSTON, Tex., Oct. 28.—Activity in Gulf Coast refinery markets continues to center around meeting lend-lease demands. Bids for an additional volume of products totaling upwards of 2,000,000 bbl. for November and December delivery were received by the U. S. Navy during the week. Of this about 1,000,000 bbl. was for gasoline, the remainder being largely diesel index gas oils and fuel oil.

So far bids have not been awarded although again most bids were at prices substantially above current spot-market quotations. Bids for gasoline were about in line with previous award prices ranging from around 6½ to 6¾ cents. Bids on diesel index gas oils ranged from about 4¼ cents to 4½ cents for 48 diesel index. Bids for fuels ranged from $1.02½ to $1.05.

Fuel sought was a product comparable to regular No. 5 grade. The bids indicated a slight softening, being a little below previous bids for equivalent material. This product, however, has been one of the most competitive products on the market.

Lend-lease buying is cleaning up the market for diesel index gas oils. Practically the only gas oils now available are those meeting No. 2 heating-oil specifications, and a few diesel index oils not meeting the Navy's buying specifications. What little heating oil there is is fairly well concentrated in the hands of suppliers in a position to hold for advanced market prices.

How the lend-lease requirements for gasoline are to be met remains somewhat of a mystery to market

(Continued on Next Page)

A.P.I. Weekly Refinery Statistics

Week Ended October 25, 1941

	Capacity reporting (per cent)	Total gasoline stocks (bbl.)	Residual fuel-oil stocks (bbl.)	Gas oil and distillate stocks (bbl.)	Daily crude runs (bbl.)
East Coast	100.0	19,547,000	10,907,000	20,771,000	669,000
Appalachian	83.8	3,149,000	400,000	663,000	126,000
Ind., Ill., and Ky.	84.4	15,382,000	4,641,000	5,934,000	651,000
Okla., Kans., and Mo.	80.7	7,309,000	2,195,000	2,179,000	319,000
Inland Texas	63.2	2,381,000	1,353,000	474,000	142,000
Texas Gulf	91.0	11,527,000	8,947,000	6,380,000	969,000
Louisiana Gulf	94.2	2,501,000	2,068,000	1,857,000	152,000
N. Louisiana and Ark.	49.9	413,000	397,000	407,000	53,000
Rocky Mountains	50.1	999,000	307,000	132,000	55,000
California	90.9	14,715,000	62,755,000	12,961,000	558,000
Total reported	86.4	77,923,000	93,970,000	51,758,000	3,964,000
Est. unreported	.....	5,420,000	1,325,000	1,425,000	366,000
*Est. total	.....	†83,343,000	95,295,000	53,183,000	4,060,000
*Est. total previous wk.	.....	82,584,000	95,800,000	52,403,000	4,120,000
*Oct. 26, 1940	.....	79,800,000	107,123,000	48,990,000	3,565,000

*Bureau of Mines. †Includes 7,130,000 bbl. aviation gasoline.

Stocks of Crude Oil in the United States

(BUREAU OF MINES ESTIMATES)

Week ended October 18, 1941	243,605,000 barrels
Week ended October 11, 1941	243,571,000 barrels
Week ended October 19, 1940	262,098,000 barrels

Figures do not include stocks of heavy, unrefinable California crude.

RETAIL OIL MARKETS...

Tank-wagon and filling-station prices on gasoline and kerosene furnished by larger marketing firms

Prices as of October 28, 1941

Taxes

The gasoline quotations given in the following tables include the 1½-cent federal tax, as well as state, county, and city taxes. The gasoline is the regular or standard grade. In most areas lower grades and a premium grade also are available.

Standard Oil Co. (Indiana)

	Gasoline Tank wag.	Gasoline Dlr. wag.	Gasoline Inc. tax	Kero. tank wag.
Chicago, Ill.	16.1	14.1	4.5	10.3
Decatur	15.4	13.4	4.5	9.5
Joliet	16.4	14.1	4.5	10.3
Peoria	16.2	13.7	4.5	10.1
Quincy	13.4	12.4	4.5	10.0
Davenport, Ia.	16.2	14.7	4.5	10.1
Des Moines	15.9	11.9	4.5	9.8
Mason City	16.2	14.7	4.5	10.1
Duluth, Minn.	17.7	16.2	5.5	10.6
Mankato	17.4	15.9	5.5	10.3
Minneapolis	17.4	15.9	5.5	10.3
La Crosse, Wis.	17.4	15.9	5.5	10.3
Green Bay	17.7	16.2	5.5	10.6
Milwaukee	17.6	16.1	5.5	10.5
Detroit, Mich.	15.9	14.4	4.5	9.6
Grand Rapids	15.9	14.4	4.5	9.6
Saginaw	15.9	14.4	4.5	9.6
Evansville, Ind.	16.9	15.4	5.5	9.6
Indianapolis	17.1	15.2	5.5	9.8
South Bend	17.5	16.0	5.5	10.2
Fargo, N. D.	18.4	16.9	5.5	11.3
Huron, S. D.	17.8	16.3	5.5	10.7
Kansas City, Mo.*	14.9	13.4	4.5	9.4
St. Louis*	14.8	13.3	4.5	9.8
St. Joseph	15.7	14.2	4.5	9.6
Wichita, Kans.	14.8	12.7	4.5	8.0

*State tax 2 cents, 1-cent city tax, and 1½-cent federal tax.

Exclusive of state general sales taxes.

Discounts to commercial consumers. On purchases per month off tank-wagon prices: 1,000 gal. or more, 1.5 cents off, minimum delivery 25 gal.

Stanolex Fuel Oil in Chicago

Effective Sept. 18, 1941, f.o.b. Chicago, tank-wagon prices: Standard heater oil, 1-99 gal., 9.0 cents; 100-149 gal., 8.0 cents; 150 gal. and over, 7.5 cents. Stanolex fuel oil No. 1, 1-99 gal., 8.5 cents; 100-149 gal., 7.5 cents; 150-399 gal., 7.5 cents; 400 gal. and over, 7.0 cents. Stanolex furnace oil, 1-99 gal., 8.5 cents; 100-149 gal., 7.5 cents; 150-399 gal., 7.5 cents; 400 gal. and over 7.0 cents. Stanolex fuel oil A, 1-99 gal., 8.0 cents; 100-399 gal., 7.0 cents; 400-749 gal., 6.0 cents, 750 gal. and over, 5.25 cents. Stanolex fuel oil B, 1-99 gal., 8.0 cents; 100-399 gal., 7.0 cents; 400-749 gal., 6.0 cents; 750 gal. and over 5.25 cents. Stanolex Bunker C fuel oil, 1-399 gal., 6.5 cents; 400-999 gal., 5.5 cents; 1,000 gal and over, 4.5 cents.

Ohio

STANDARD OIL CO. OF OHIO

	Gasoline Cons'r tank wag.	Gasoline Divided dlr.	Gasoline Inc. tax	Kero. tank wag.
Ohio points	16.0	15.0	5.5	*9.0

*Includes state tax of 1 cent.

Southern District

STANDARD OIL CO. (KENTUCKY)

	Gasoline Cons'r tank wag.	Gasoline Net dlr.	Gasoline Inc. tax	Kero. tank wag.
Atlanta, Ga.	18.00	18.00	7.5	10.0
Augusta	18.00	18.00	7.5	9.5
Macon	18.00	18.00	7.5	10.0
Savannah	17.00	17.00	7.5	9.0
Birmingham	18.50	18.50	8.5	8.0
Mobile	18.50	18.50	9.5	8.5
Montgomery	19.50	19.50	9.5	10.0
Jackson, Miss.	17.50	17.50	7.5	9.0
Vicksburg	17.00	17.00	7.5	8.5
Jacksonville, Fla.	18.00	18.00	8.5	8.0
Miami	18.00	18.00	8.5	8.0
Pensacola	18.50	18.50	9.5	8.0
Tampa	18.00	18.00	8.5	8.0
Lexington, Ky.	17.00	17.00	6.5	9.0
Covington	16.0	16.0	6.5	9.0
Louisville	16.50	16.50	6.5	8.5
Paducah	16.50	16.50	6.5	8.5

Price basis to tank-wagon consumers, effective January 4, 1937, 3 cents per gallon below tank-wagon price.

Montgomery, Ala., has a county tax of 1 cent per gallon, and a city tax of 1 cent per gallon on gasoline, in addition to state tax, and 1 cent per gallon on kerosene. Mobile, Ala., has a city gasoline tax of 2 cents per gallon; Birmingham, Ala., has a city gasoline tax of 1 cent per gallon; Pensacola, Fla., has a city gasoline tax of 1 cent. All are included in the table.

Atlantic Coast District

STANDARD OIL CO. OF NEW JERSEY

	Gasoline Cons'r tank wag.	Gasoline Dlr. tank wag.	Gasoline Inc. tax	Kero. tank wag.
Atlantic City	13.5	14.0	4.5	7.9
Newark	13.5	14.0	4.5	7.9
Annapolis	14.85	15.35	5.5	9.7
Baltimore	14.25	14.75	5.5	8.7
Cumberland	15.65	16.15	5.5	10.2
Washington, D. C.	12.50	13.00	3.5	9.2
Danville, Va.	16.95	17.45	6.5	10.45
Norfolk	15.75	16.25	6.5	10.2
Petersburg	16.05	16.55	6.5	11.2
Richmond	16.05	16.55	6.5	11.2
Roanoke	17.25	17.75	6.5	10.7
Charles'n, W. Va.	17.55	18.05	6.5	11.5
Parkersburg	16.85	17.35	6.5	11.5
Wheeling	16.85	17.35	6.5	11.8
Charlotte, N. C.	18.40	18.90	7.5	9.5
Hickory	18.95	19.45	7.5	10.5
Mount Airy	18.80	19.30	7.0	9.7
Raleigh	18.15	18.65	7.0	10.5
Salisbury	18.45	18.95	7.5	10.9
Charleston, S. C.	17.25	17.75	7.5	(*)
Columbia	18.10	18.60	7.5	(*)
Spartanburg	18.80	19.30	7.5	(*)

Price basis to Essolene undivided dealers: Dealer tank-wagon price less 0.5 cent per gallon. Price basis to commercial consumers, effective March 8, 1937, in Maryland, District of Columbia, and in Arlington and Fairfax counties in Virginia and March 12 in New Jersey: To contract accounts purchasing at least one full compartment at a time by hose connections, on yearly purchases: From 2,500 to 100,000 gal., consumer tank-wagon price at time and place of delivery: 100,000 gal. per year, consumer tank-car price plus 0.5 cent per gallon. Consumer tank-wagon price generally will be equivalent to dealer tank-wagon price less 0.5 cent per gallon.

Effective January 16, 1939, in North Carolina the commercial consumer schedule became as follows: Single deliveries of 50 gal. or more, consumer tank-wagon price. Single deliveries of less than 50 gal., 4 cents per gallon over consumer tank-wagon price. Generally the posted consumer tank-wagon price will be equivalent to the dealer price, less 0.5 cent per gallon. The above policy also applies in South Carolina, effective January 23, 1939.

*Kerosene business of the company at these points now exclusively handled by dealers.

Pennsylvania and Delaware

ATLANTIC REFINING CO.

	Gasoline Cons'r tank car	Gasoline Dlr. tank wag.	Gasoline Inc. tax	Kero. tank wag.
Philadelphia, Pa.	14.0	15.0	5.5	10.15
Pittsburgh	14.5	15.5	5.5	10.5
Allentown	14.5	15.5	5.5	10.5
Erie	14.5	15.5	5.5	10.5
Scranton	14.5	15.5	5.5	10.5
Altoona	14.5	15.5	5.5	10.5
Dover, Del.	...	15.5	5.5	10.5
Wilmington	...	15.0	5.5	10.0

Price basis to undivided dealers, dealer tank-wagon price less 0.5 cent per gallon.

Discount on kerosene, 2 cents per gallon off tank-wagon price on tank-wagon deliveries of 25 gal. or more at one time.

Pacific Coast Territory

STANDARD OIL CO. OF CALIFORNIA

	Gasoline Tank truck* wag.	Gasoline Serv. sta.	Gasoline Inc. tax	Kero. tank wag.
San Francisco	14.5	18.5	4.5	11.5
Los Angeles	14.0	18.0	4.5	10.0
Fresno, Calif.	15.5	19.5	4.5	12.5
Phoenix, Ariz.	18.5	22.5	6.5	12.5
Reno, Nev.	17.5	21.5	5.5	13.5
Portland, Ore.	17.0	21.0	6.5	13.5
Seattle, Wash.	17.0	21.0	6.5	13.5
Spokane	19.0	23.0	6.5	16.5
Tacoma	17.0	21.0	6.5	13.5

*Posted net tank-truck prices (including tax).

Resale and commercial discounts, effective October 1, 1941: Tank-car deliveries 0.25 cent a gallon off posted net tank truck. Commercial: Retail deliveries, and/or tank-truck deliveries of less than 40 gal., 4 cents per gallon above posted net tank-truck price for Standard Aviation, Standard's Supreme, and Standard Gasoline, and 3 cents per gallon above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gal. to marine trade only, which are billed at posted net tank-truck price.

New York and New England

SOCONY-VACUUM OIL CO., INC.

	Gasoline Comm. tank wag.	Gasoline Dlr.* wag.	Gasoline Inc. tax	Kero. tank wag.
Albany	14.2	14.7	5.5	7.7
Met. New York	14.4	14.9	5.5	8.0
Buffalo	14.5	15.0	5.5	8.3
Rochester	15.1	15.6	5.5	8.8
Syracuse	14.8	15.3	5.5	8.7
Portland, Me.	14.6	15.1	5.5	8.1
Manchester, N. H.	15.6	16.1	5.5	9.0
Burlington, Vt.	15.2	15.7	5.5	8.3
Boston, Mass	13.2	13.7	4.5	8.0
Worcester	13.8	14.3	4.5	8.1
Hartford, Conn.	13.9	14.4	4.5	7.6
New Haven	13.3	13.8	4.5	6.9
Providence, R. I.	13.3	13.8	4.5	7.8

*Undivided.

Effective August 8, 1940, the company changed its commercial consumer policy in New York and New England to the following:

Full compartment deliveries: Accounts buying less than 20,000 gal. annually, 0.5 cent above the commercial-consumer price; accounts buying from 20,000 to 120,000 gal. annually, commercial-consumer price; accounts buying 120,000 gal. annually and above, 0.25 cent off consumer price. Split compartment deliveries: Delivery of less than a full compartment, 250 gal., commercial-consumer price plus 1 cent. Steel-barrel deliveries: Commercial price plus 3 cents.

Rocky Mountain District

CONTINENTAL OIL CO.

	Gasoline Tank wag.	Gasoline Inc. tax	Kero. tank wag.
Denver, Colo	14.5	5.5	11.0
Grand Junction	18.0	5.5	12.5
Pueblo	14.5	5.5	9.5
Casper, Wyo.	17.0	5.5	12.0
Cheyenne	16.0	5.5	11.5
Billings, Mont.	18.0	6.5	12.5
Butte	17.0	6.5	13.5
Great Falls	17.0	6.5	12.5
Helena	17.0	6.5	13.0
Salt Lake, Utah	18.5	6.5	14.5
Boise, Idaho	†20.1	6.5	16.5
Twin Falls	†21.1	6.5	17.0
Albuquerque, N. M.	*17.5	7.0	10.0
Roswell	*15.5	7.0	8.5
Santa Fe	‡18.0	7.5	10.0

*Includes city tax of 0.5 cent. †Includes toll-bridge tax of 1 mill. ‡Includes city tax of 1 cent.

Tank wagon represents price to consumers. Dealer represents price to dealers. If no dealer price is quoted, the tank-wagon price applies to all classes of trade.

Oklahoma and Arkansas

CONTINENTAL OIL CO.

	Gasoline Tank wag.	Gasoline Incl. tax	Kero. tank wag.
Texarkana, Ark.	14.0	5.5	6.0
Fort Smith	15.5	7.0	6.5
Little Rock	17.25	8.0	8.0
Muskogee, Okla.	15.0	7.0	8.0
Oklahoma City	15.0	7.0	8.0
Tulsa	15.0	7.0	8.0

Tank wagon represents price to consumers. If no dealer price is quoted, the tank-wagon price applies to all classes of trade.

Central South District

STANDARD OIL CO. OF LOUISIANA

	Gasoline Cons'r tank wag.	Gasoline Dlr. tank wag.	Gasoline Incl. tax	Kero. tank wag.
New Orleans, La.	17.25	17.50	8.5	‡10.0
Baton Rouge	17.25	17.50	8.5	‡10.5
Alexandria	17.25	17.50	8.5	‡10.5
Lafayette	17.50	18.00	8.5	‡10.0
Lake Charles	17.50	18.00	8.5	‡12.0
Shreveport	17.00	17.0	8.5	‡9.0
Knoxville, Tenn.	20.00	20.50	8.5	12.5
Memphis	17.25	17.75	8.5	10.5
Chattanooga	19.00	19.5	8.5	11.0
Nashville	19.00	19.5	8.5	10.0
Bristol	18.25	18.75	8.5	12.0

Esso at dealer price less 0.5 cent per gallon to undivided dealers.

‡Includes 1-cent state tax

Price basis to commercial consumers throughout Louisiana, Arkansas, and Tennessee: On single deliveries of 50 gal. or more at a time—posted consumer tank-wagon price. On single deliveries of less than 50 gal. at a time—posted consumer tank-wagon price plus 4 cents per gallon. Generally, the posted consumer tank-wagon price is the same as the posted dealer tank-wagon price, less 0.5 cent per gallon.

Nebraska

STANDARD OIL CO. OF NEBRASKA

	Gasoline Tank wag.	Gasoline Dlr.	Gasoline Incl. tax	Kero. tank wag.
Omaha	17.9	15.4	6.5	9.8
McCook	18.5	15.9	6.5	9.5
Norfolk	18.4	16.9	6.5	10.3
North Platte	18.8	16.4	6.5	10.7
Scottsbluff	18.9	16.0	6.5	9.5

Discounts to commercial consumers for tank-wagon deliveries covered only by standard commercial consumers contract, effective January 1, 1935.

Texas

	Gasoline Tank wag.	Gasoline Serv. sta.	Gasoline Incl. tax	Kero. tank wag.
Dallas, Tex.	14.0	17.0	5.5	7.0
Fort Worth	14.0	17.0	5.5	7.0
Houston	14.0	18.0	5.5	8.0
San Antonio	14.0	18.0	5.5	7.0

Naphtha

STANDARD OIL CO. (INDIANA)

	Tank wagon*
Oleum spirits	16.2
V.M.&P. naphtha	16.5
Cleaners' naphtha	15.5
Stanisol	15.5

*Prices include 3-cent Illinois tax but not 1-cent federal tax nor 2 per cent retail occupational tax.

Prices f.o.b. Chicago. Each price subject to discount of 1 cent per gallon for 150-gal. lots if covered by contract.

Canada

3-Star Imperial Gasoline
IMPERIAL OIL, LTD.

	Gasoline Tank wag.	Gasoline Incl. tax	Kero. tank wag.
Halifax, N. S.	29.5	13.0	19.0
St. John, N. B.	29.5	13.0	19.0
Montreal, Que.	28.0	11.0	17.5
Toronto, Ont.	28.5	11.0	18.0
Hamilton, Ont.	28.5	11.0	18.0
Winnipeg, Man.	30.5	10.0	22.5
Brandon, Man.	31.0	10.0	23.0
Regina, Sask.	28.0	10.0	20.0
Saskatoon, Sask	30.8	10.0	22.8
Edmonton, Alta.	28.9	10.0	20.9
Calgary, Alta.	26.0	10.0	18.0
Vancouver, B. C.	25.0	10.0	24.0

Tank-Wagon Changes

Standard Oil Co. of Louisiana reduced the dealer and tank-wagon price of regular gasoline 1 cent per gallon at Memphis, Tenn., effective October 16.

New York Markets

(Continued from Preceding Page)

not been reflected in any easing of spot quotations. However, reports in the trade have indicated that discounts have been allowed consumers on furnace oil in some instances. This was a general practice last winter, but now cases of discounts allowed are few and far between.

Gulf Coast Markets

(Continued from Preceding Page)

observers. Independent refiners on the coast report being completely sold up until the middle of December, yet are being requested to supply the lend-lease demand. It has been indicated, however, that the lend-lease orders are to hold priority over most previous commitments on undelivered material and plant production.

Because of this situation, there is no material for the spot market, and present quoted prices remain nominal. Bunker C fuel remains about the only product open to spot buying. There have been no lend-lease calls for this fuel, which for some time has been more or less marking time, maintaining, however, a fairly firm position.

PRICES OF REFINED PRODUCTS...

All quotations f.o.b. plant in cars for interstate or export movement except as otherwise noted

Prices as of October 28, 1941
(Most prices in cents per gallon)

The quotations are exclusice of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils. Octane ratings in Middle West, Mid-Continent, and Southwest are based on A.S.T.M. method of testing.

Refinery Gasoline

OKLAHOMA (Group 3)—

U. S. Motor grades:		
72-74 octane (regular)	.06	.0625
63-66 octane	.05625	.05875
60 octane and below	.0525	.055
60-62 400 grades:		
72-74 octane (regular)	.06	.0625
63-66 octane	.05625	.05875
60 octane and below	.0525	.055

NORTH TEXAS—

U. S. Motor grades:		
72-74 octane (regular)	.05875	.06125
63-66 octane	.0550	.06
60 octane and below	.05125	.05375
60-62 400	.05	.06

NORTH LOUISIANA (Ark. and N. La. delivery)—

U. S. Motor grades:		
72-74 octane (regular)	.05875	.06125
63-66 octane	.0550	.05875
60 octane and below	.05	.06

ARKANSAS (Ark. and N. La. del.)—

U. S. Motor grades:		
72-74 octane (regular)	.05875	.06125
60 octane and below	.05	.05375

CHICAGO (Based on Group 3)—

U. S. Motor grades:		
72-74 octane (regular)	.06	.0625
63-66 octane	.05625	.05875
60 octane and below	.0525	.055
60-62 400 grades:		
72-74 octane (regular)	.06	.0625
63-66 octane	.05625	.05875
60 octane and below	.0525	.055

PENNSYLVANIA (inland refineries)—

74-76 octane (regular)	.0750	.0775
80 octane (1939 Research)		.0800

CALIFORNIA (domestic movement)—

58-60 400, 65 oct. and higher	.065	.0725
54-58 U. S. Motor	.0575	.0625

EAST COAST (domestic)—

U. S. Motor (minimum 72 octane):		
New York (Bayonne)*	.08	.085
Philadelphia	.08	.0825
Boston	.085	.09
Baltimore	.08	.0825
Charleston, S. C.	.0725	.0775

*All grades of gasoline ½ to ¼ cent less for barge shipments. New York Harbor prices are for New York and New England delivery. Prices for New Jersey delivery ¼ cent lower.

GULF COAST (domestic)—

U. S. Motor grades:		
80 plus (research)	.06625	.0675
72-74 octane (leaded)	.0625	.06375
70-72 octane (unleaded)	.0625	.0650
68-70 octane (unleaded)	.0625	.0650

Natural Gasoline

OKLAHOMA (Group 3)—

Grade 26-70		.05125
Grade 18-55	.06125	.0625

NORTH TEXAS—

Grade 26-70		.0475
Grade 18-55	.05625	.0575

CALIFORNIA—

75-85 375-390	.045	.05

NORTH LOUISIANA (Ark. and N. La. delivery)—

Grade 26-70		.0475

Tractor Fuel

OKLAHOMA (Group 3)—

40-42 gr., 315-325 l.b.p. 110-flash, 540-550 e.p.	.0375	.03875
41-43 gr., 300-320 l.b.p. 110-125 flash, 500-520 e.p.	.03875	.04
46-48 gr., 210-230 l.b.p. 480 max., e.p.	.04125	.0425

Kerosene

(All kerosene water white)

OKLAHOMA (Group 3)—

42-44	.0450	.0475
41-43	.04375	.04625

NORTH TEXAS—

41-43	.0425	.04625

NORTH LOUISIANA (Ark. and N. La. delivery)—

41-43	.04375	.04625

ARKANSAS (Ark. and N. La. del.)—

41-43	.04375	.04625

PENNSYLVANIA (inland refineries)—

46	.0625	.06625
45	.0625	.065

CHICAGO (Based on Group 3)—

42-44	.0450	.0475
41-43	.04375	.04625

CALIFORNIA (Pac. Coast market)—

38-40 high-burning test	.045	.055

NEW YORK (Bayonne, N. J.)—

41-43		.055

GULF COAST (domestic)*—

41-43	.04	.04125

*Barge price ⅛ cent lower.

Furnace Oil

OKLAHOMA (Group 3)—

Range oil	.04	.0425
No. 1 white (38-42)	.03875	.04125
No. 2 straw (32-36)	.03625	.03875
No. 3 zero to 10 (28-32)	.035	.0375

NORTH TEXAS—

No. 1 white (38-42)	.03825	.04125

NORTH LOUISIANA (Ark. and N. La. delivery)—

No. 2 (32-36)	.0325	.035

ARKANSAS (Ark. and N. La. del.)—

No. 2, 32-36	.0325	.035

CHICAGO (Based on Group 3)—

Range oil	.04	.0425
No. 1 white (38-42)	.03875	.04125
No. 2 straw (32-36)	.03625	.03875
No. 3 zero to 10 (28-32)	.035	.0375

NEW YORK (Bayonne, N. J.)—

*No. 1		.055
*No. 2	.051	.0525
*No. 3	.051	.0525

*Barge deliveries ⅛ to ¼ cent under above tank-car price.

Gas Oil and Fuel Oil

(Gas oil per gal., fuel oil per bbl.)

OKLAHOMA (Group 3)—

No. 5, low pour point (18-22)	.85	.90
No. 6, 15 and above (10-16)	.85	.90

NORTH TEXAS—

No. 5, low pour point (18-22)	.80	.85
No. 6, 15 and above (10-16)	.80	.85

NORTH LOUISIANA (Ark. and N. La. delivery)—

10-14 fuel oil, industrial	.80	.85

CHICAGO (Based on Group 3)—

No. 5, low pour point (18-22)	.85	.90
No. 5, 15 and above (18-22)	.85	.90
No. 6, low pour point (10-16)	.85	.90
No. 6, 15 and above (10-16)	.85	.90

PENNSYLVANIA (inland refineries)—

36-40	.05875	.0625

CALIFORNIA—

Los Angeles:		
30-40 gas oil, per bbl.	1.10	1.25
24 plus diesel, per bbl.	1.10	1.25
24 plus diesel (bunkers)	1.20	1.35
12-16 (bunkers at tidewater)	.75	.85
10-16 (cargo lots)	.75	.85
12-17 (tank cars)	.65	.75
10-17 (high sulfur)	.55	.65
San Joaquin Valley:		
10-18 (tank cars)	.70	.85
24 plus diesel, per bbl.	1.10	1.25
San Francisco:		
24 plus diesel, per bbl.	1.35	1.40
24 plus diesel (bunkers)	1.40	1.50
10-16 (bunkers)	.80	.85

GULF COAST—

No. 2 fuel		.04
43-47 diesel		.04125
48-52 diesel	.04125	.0425
53-57 diesel		.0425
58-and-above diesel	.0425	.04375
Diesel bunkers		1.45
Bunker C (bulk cargoes)		.90
Bunker C (bunkers)		.85

NEW YORK (Bayonne, N. J.)—

27 plus, gas oil		.050
28-30 diesel (lighterage 6¼c per bbl.)		2.15
28-30 diesel (tank cars)		.05
Bunker C (to ocean-going ships in N. Y. Harbor)	1.35	1.45
Industrial fuel (tank cars)		.044

Lighterage charge 5c bbl. additional.

Bright and Steam Refined

OKLAHOMA (Group 3)—

200-210 D, 10-25		.27
150-160 D, 0-10		.23
150-160 D, 10-25		.225
120-125 D, 0-10		.225
120-125 D, 10-25		.22
Steam refined:		
600 dark green (untreated)		.145

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour point		.305
15 pour point		.295
25 pour point	.25	.28
Steam refined:		
600	.15	.16
650	.155	.165
600 flash	.16	.18
630 flash	.17	.185

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

0-10 pour point:		
150-3		.145
180-3		.15
200-3		.15
250-3		.165
280-3		.175
280-4		.17
300-3		.185
350-3½		.19
400-3½		.20
500-3½		.205
600-3½		.21
100-2½ paraffin oil 10-25		.0825
10-25 pour point:		
200-3		.145
250-3		.16
280-3		.17
280-4		.165

CALIFORNIA (moving to dom. mkt.)—

Pale oils:		
200-2½-3	.07	.0775
300-2½-3	.07	.0775
400-3-4	.0725	.08
450-3-4	.0725	.08
550-3-4	.0875	.1075
600-3-4	.0875	.11
Red oils:		
200-4-5	.07	.0775
300-5-6	.0725	.08
350-5-6	.09	.11
400-5-6	.09	.11
450-5-6	.09	.1125
500-5-6	.0925	.1125
600-5-6½	.0925	.1125
700-6½ plus	.0925	.1125
750-6½ plus	.0925	.1125
900-6½ plus	.0925	.1125

GULF COAST—

Pale oils:		
100-3	.0625	.0650
200-3	.0850	.0875
300-3	.09	.0925
500-3½	.0975	.10
750-3½	.10	.1025
1,200-3½	.1025	.10375
2,000-4	.1050	.1075
3,000-4	.1225	.1250

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		.385
10 pour point		.375
15 pour point		.365
25 pour point		.31
200 vis., at 70° F., 3 color:		
Zero pour point		.405
10 pour point		.395
15 pour point		.385
25 pour point		.33

Wax and Petrolatum

(Prices per pound)

OKLAHOMA (Group 3)—

124-126 (A.m.p.) w.c. scale	.06	.06125

PENNSYLVANIA (inland refineries)—

122-124 (A.m.p.) w.c. scale		.0625
124-126 (A.m.p.) w.c. scale		.0625

NEW YORK—

Wax in bags fully refined:		
125-127 (A.m.p.) wax	.0560	.0640
128-130 (A.m.p.) wax	.0560	.0660
130-132 (A.m.p.) wax		.0585
133-135 (A.m.p.) wax		.0615
135-137 (A.m.p.) wax		.0640
Crude scale:		
124-126 (A.m.p.) w.s.		.0625
124-126 (A.m.p.) y.s.		.0625
Petrolatum in barrels, carload lots:		
Dark green		.02875
Amber	.02875	.03125
Extra amber	.03125	.03375
Lily white	.04875	.05375
Snow white	.05625	.05750
Cream	.04125	.05250

Export Prices

GASOLINE

GULF COAST—

60-62 400	.0550	.0675
61-63 390	.0575	.0650
64-66 375	.0575	.0650

LOS ANGELES—

U. S. Motor grades:		
Above 60 octane	.06	.0625
65-69 octane	.0575	.06
60-65 octane	.0525	.055

KEROSENE

GULF COAST—

41-43 water white	.0375	.04

LOS ANGELES—

41-43 water white	.05	.0525

LUBRICANTS

(Pennsylvania Grade)

NEW YORK (f.a.s. in bbl.)—

Cylinder stocks:		
600 S. R. unfiltered		.265
630 S.R. unfiltered		.27
600 flash, S.R.		.265
650 flash, S.R.		.27
Bright stock:		
Light, 25 pour point	.36	.37

NEUTRAL OIL

200-3 color	.43	.50
150-3 color	.41	.46

PARAFFIN WAX

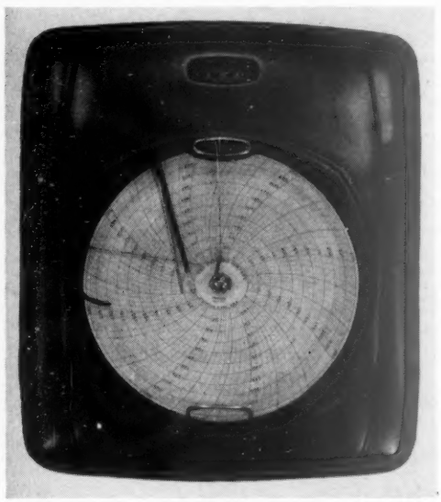
NEW YORK (prices per bbl.)—

123-125 A.m.p.	.0560	.0625
125-127 A.m.p.	.0560	.0625
128-130 A.m.p.	.0585	.0650
133-135 A.m.p.	.0615	.0700
135-137 A.m.p.	.0640	.0700
Crude scale:		
124-126 w.s.		.0625
124-126 y.s.		.0625

EQUIPMENT PROGRESS...

Foxboro Announces Model 30 Stabilog Controller

When the Foxboro Co. introduced the Stabilog controller, it was featured as the first instrument providing full proportional control with automatic reset



of the control point. Many thousands of installations have since been made, in applications involving control of temperature, pressure, liquid level, or flow; and it is an impressive fact that in more than 10 years of this field experience, no changes have been found necessary in the fundamental principles of operation.

In introducing the new Model 30 Stabilog controller, now, Foxboro emphasizes the fact that the new features are principally refinements, for better appearance and still closer control, but that the Model 30 does not depart from the tested and proven Stabilog control principles.

The Model 30 appears in the new universal rectangular case, which combines practical convenience with attractive appearance. When panel-mounted, the instrument extends only ¾ in. from the panel surface. The door is recessed; hinges and hasp are flush with the door surface. A dual pressure indicator, replacing the customary two small gages, is easily seen through a rectangular opening in the door. Interior illumination is readily provided when desired.

All operating adjustments are made from the front of the case. Recording and indicating Model 30 controllers are illustrated and described in Bulletin A-252 which will be sent by the Foxboro Co., Foxboro, Mass.

TRADE LITERATURE

D. W. HAERING & CO., 205 West Wacker Drive, Chicago, Ill.—"Organic Methods of Scale and Corrosion Control," a text booklet on the use of organic chemicals in water treating. This new 28-page discussion of organic methods presents the newest information on scale and corrosion control. It is a fourth edition and has incorporated a number of charts, graphs, tables and photographs to illustrate the usefulness of organic chemicals in water conditioning.

BASTIAN-BLESSING CO., 4201 Peterson Avenue, Chicago, Ill.—A convenient reference manual, the RegO LP Gas Pocket Guide. The guide contains basic data, charts, tables, and other information relevant to the industry.

BROWN INSTRUMENT CO., Wayne and Roberts Avenues, Philadelphia, Pa.—Bulletin 3-5, describing the new rectangular-case bourdon tube pressure gage to match their well-known line of rectangular case instruments. It contains photographs of the interior view of the instrument, which has a patented recalibrator to provide a means for easily and accurately setting the pen on zero.

NORTON CO., Worcester, Mass.—A handbook on thread grinding for operators of Jones & Lamson and Ex-Cell-O thread-grinding machines. Pages are provided at the back where data on difficult or unusual jobs can be conveniently recorded.

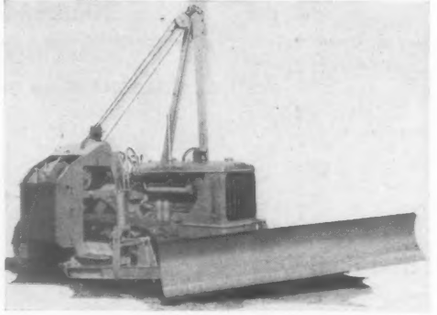
THE DILLON CO., 226 East Third Street, Tulsa.—A pamphlet describing Dillon couplings and their various applications in pipe lines, christmas trees, tank connections, valves, separators and other oil, gas, water or air pressure or vacuum installations.

THE INFERNO CO., Shreveport, La., Department Gs-1.—Bulletin 23, describing the illuminated gage stand on which all boiler gages may be placed together for easy visibility and accurate comparison. It is claimed that gages so mounted are more accurate, being away from the excessive heat of the top of the boiler. The Inferno gage stand is illuminated to increase visibility at night or on murky days.

FREDERICK POST CO., 3650 North Avondale Avenue, Chicago, Ill.—The new Giant Post Decimal Equivalent wall chart to those who ask for it on their business stationery. It is of giant size, 26 by 39 in. It is printed in large heavy type which can be easily read 50 ft. away. And, lastly, it is printed in two colors, red and black, on a white background making it attractive and more important the color separation adds to readibility. It brings all the equivalents from 1/64 to 63/64 within easy reading of your eyes.

Cardwell Blade Backfiller Is Efficient Pipe Liner

The new Cardwell combination side boom and backfiller is an unusually efficient and profitable pipe-line unit. Mounted on the new Caterpillar D-6 tractor, the Cardwell side boom with blade backfiller handles and lays pipe, then can return immediately and backfill the ditch without disassembling the side boom or blade



backfiller. The blade is hydraulically operated by a single lever.

The controlled down pressure of the blade makes it easy to smooth grades, build rights-of-way and maintain roads, and also makes it possible to cut hard, crusty spoil pile without plowing. Push beams may be adjusted for variation of sidecasting angles or for bulldozing. Blade may be detached by removing three pins, or the blade and frame assembly may be detached in 10 minutes and the tractor backed out, leaving the side boom intact.

Three models of blade backfillers, available for mounting with Cardwell side booms on Caterpillar D-4, D-6 and D-7 diesel tractors, are offered by Cardwell Manufacturing Co., 801 South Wichita, Wichita, Kans.

Lincoln Protective Control Guards Against Burnout

Complete protection against heat or excessive current, or both, is provided by a new protective control device for arc-welding machines just announced by the Lincoln Electric Co., Cleveland, Ohio. According to the manufacturer, the new development creates advantages not previously available. It is said that a welding machine equipped with this new Lincoln device, which provides protection against burnout, can be operated at maximum capacity for long periods without harm.

The protective control device (see accompanying illustration) consists of two current transformers, the primaries of which are connected in series with the motor leads and the secondaries supplying power to

operate two snap-action thermostats which are mounted directly on the motor lamination (lower device in illustration). These thermostats are connected to the lamination in such a way that they operate by means of heat conduction as well as by current passing through the thermostat. The thermostats automatically reset when the motor returns to a safe operating temperature or when the current is reduced, and no manual operation is required to start the machine, except pushing the start button.

Asphalt Coatings Pinch Hit for Metal Paints

Asphaltic paints have proved unusually effective for protecting iron sheets, structural steel, metal buildings, bridges, heavy machinery, ornamental iron work, black iron sheets and duct work, sheet-metal items, etc., as substitutes for some other products now on the priorities list.

A coating of this type is produced by the Philip Carey Manufacturing Co., Cincinnati, Ohio, and marketed under the brand "Careyclad." This product has for many years been used for rust and weatherproofing by leading industrial and transportation companies.

Careyclad coating, which includes a relatively high percentage of asbestos fiber, is rather highly abrasion resistant and is resistant to all three of the most commonly prevailing adverse atmospheric conditions: acid, alkaline, and salt. Careyclad is also highly resistant in direct contact with weak acid, weak alkali and salt solutions.

Careyclad can be applied by either spray painting, brushing, or dipping at every-day indoor or outdoor temperatures. The only distinction being made is between winter and summer grade.

Careyclad will protect metal against: (1) Rusting; (2) mild acid-air concentrations (3) mild alkaline-air concentrations, and (4) with reference to air temperatures of 125° to 250° F., the melting point of the as-

phalt used in this particular coating is 220°; however, it would probably not be safe to use this material where temperatures over 180° will prevail, particularly on vertical or sharply inclined surfaces.

Careyclad is a black material and can be painted over with asphalt-base aluminum paint, after which, if some other color is desired, it can be painted with the various types of prepared paints available.

AMONG EQUIPMENT MEN...

Nordstrom Plant Invites A.P.I. Visitors to Oakland

Open house will hold forth at the Nordstrom valve factory in Oakland, Calif., during the week of the A.P.I. sessions in San Francisco, Calif. An open invitation to all A.P.I. visitors is being extended by officials of Merco Nordstrom Valve Co. and Pittsburgh Equitable Meter Co. to inspect their plant and witness new methods of valve manufacture and testing. A fleet of autos will be available at all times to give courtesy transportation from all hotels, to and from the plant, at the convenience of guests.

Entertainment headquarters of the two companies will be at the Mark Hopkins, Suite 710, atop Nob Hill, and an additional suite has been reserved at the Fairmont, across the street from the former. A.P.I. guests are invited to make these two spots their rendezvous for rest and recreation and are requested to phone the headquarters, Exbrook 3434 for transporation.

Those actively in charge of entertainment and plant tours include Sven Nordstrom; Dave Stratton, general manager of the plant; Russ Waters, Ed Matheson, Ed Hedene, George Scherer and Gilbert Bowman.

The contingent of Nordstrom and Pittsburgh Equitable officials and representatives who are leaving for the San Francisco conclave will be headed by Col. W. F. Rockwell, president; Capt. A. E. Higgins, vice president in charge of sales; H. Boezinger, vice president in charge of West Coast sales; Art Kerr and Jack Cottrell, Tulsa; Don Foster, Pittsburgh; Paul Kruech, Chicago; Carl Madison, Houston; Orville Cochran, Kansas City, and Andy Fomilyant, Ernie Adams and Pete Maxfield, all of Los Angeles.

Tulsa Instrument Man, Stricken On Hunting Trip, Returns Home

Ernest H. Triphaus, regional manager of Taylor Instrument Companies, Tulsa, was brought home last week from the White River National Forest in Colorado where he became ill with pneumonia several weeks ago while on a hunting trip. It was impossible to move him from the 12,000-altitude until last week and then it was necessary to make the first part of the trip on a "galloping goose," a hammock swung on two poles carried by tandem horses. Mrs. Triphaus rode into the mountains with oxygen and a nurse and took care of him until he was able to start home. His condition was much improved.

Marmon-Herrington Awards Service Button and Bonus

Called to the home office of the Marmon-Herrington Co. at Indianapolis, Ind., last week, Ernest C. King, known throughout the northeastern states as an authority on difficult transportation problems, was awarded the company' 10-year service button, and a substantial bonus, for his years of loyal devotion to the company's interests.

The presentation ceremony took place in the office of Bert Dingley, company vice president, who officiated in the absence of A. W. Herrington, president.

National Makes Parrish Superior Division Engineer

The National Supply Co. announces the appointment of Walter A. Parrish as executive engineer of the Superior engine division, with headquarters at the Springfield, Ohio, plant. Mr. Parrish was born in Detroit, Mich., and attended grade and high schools in that city, graduating from the Detroit Technical Institute in 1910.

Since that time practically his entire work has been with internal-combustion engines, and his service record is replete with names of companies famous in automobile history—Ford, Hudson, Maxwell, Lozier, Continental Engine, Packard and others.

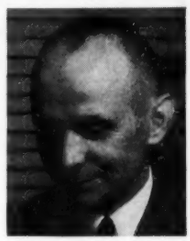
In 1939 he joined the Cummins Engine Co. at Columbus, Ind., as assistant chief engineer, serving in that capacity until his recent decision to accept this new position with the National Supply Co.

Stover Will Head Tulsa Oil Industries Committee

Howard F. Stover, secretary-treasurer and general manager of the Gaso Pump & Burner Manufacturing Co., Tulsa, was elected chairman of the oil industries committee of the Tulsa Chamber of Commerce at the committee's last meeting, succeeding W. L. James. Mr. Stover is a former president of the Tulsa Purchasing Agent's Association.

Blaw-Knox Appoints New Engineering and Sales Head

Blaw-Knox Co., Pittsburgh, Pa., announced the appointment of Edwin A. Wert as vice president in charge of engineering and sales of its power piping division. The new divisional executive, taking the position held until recently by S. J. Horrell, has been a consultant for the company for a number of years and comes from the Detroit Edison Co., where he has been engaged in an engineering and design capacity for 18 years.



Mr. Wert is well known for his work on piping design and recently developed, in behalf of Blaw-Knox Co., simplified formulae for determining the stresses in power piping systems. He is an alumnus of the University of California, was an instructor in the U. S. Air Corps during the last war, is a member of the American Society of Mechanical Engineers, and has served as a lecturer at the Detroit Institute of Technology.

Arutunoff to Address A.I.E.E. Meeting at Dallas

A. Arutunoff, president of the Reda Pump Co. of Bartlesville, Okla., has been chosen to deliver the principal address before the regular October session of the American Institute of Electrical Engineers when they convene in Dallas, Tex., this week.

Mr. Arutunoff's address will deal specifically with the operations and accomplishments of the Reda submergible electrical centrifugal pumps (of which he is designer and inventor) in the oil industry, and he plans to illustrate his lecture with slides and working models of the pump itself.

The meeting has been planned as a joint session of both the Dallas and Fort Worth chapters of the A.I.E.E. and invitations have also been extended to the American Society of Mechanical Engineers as well as representatives of the various oil companies in that section of the country.

WELL HEAD EQUIPMENT MANUFACTURERS MEET AT FORT WORTH

Members of the Association of Well Head Equipment Manufacturers who attended the regular meeting of the association at Fort Worth, Texas, October 14, are shown here. They are, standing, left to right: Charles Zartman, Rector Well Equipment Co., Inc., Fort Worth; C. L. Cron, Rector Well Equipment Co., Houston; John H. Moran, Hinderliter Tool Co., Houston; J. J. Hastik, Brown Oil Tools, Inc., Houston; Frank Crow, Cameron Iron Works, Houston; L. L. McColum, Hinderliter Tool Co., Fort Worth; C. J. Harris, Beaumont Iron Works, Beaumont; M. T. Works, Cameron Iron Works, Houston; Roy Hammond, Lone Star Tool Co., Wichita Falls; A. Henderson, McEvoy Co., Houston; Roscoe V. Evridge, Rector Well Equipment Co., Inc., Fort Worth.

Seated, left to right, are: E. L. Barker, Atlas Engineering Co., Houston; L. D. Hilton, executive secretary of the association; E. L. Lorehn, Cameron Iron Works, Houston; G. S. Watson, McEvoy Co., Houston; L. L. Rector, Rector Well Equipment Co., Inc., Fort Worth; B. V. Fisher, Oil Center Tool Co., Houston. Conferences were held throughout the day.

CLASSIFIED ADVERTISING

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OREGON BASIN FIELD, WYOMING

FOR SALE: A 4⅜ per cent, net, working interest in a 2,542 acre tract on the South Dome of the Oregon Basin Field, Park County, Wyoming, the third largest producing field in the state. The tract is well located on structure, and practically the entire area is proved up by drilling. Present operations: two producing wells, with pipe-line connections, well equipped, operated by a major company. Reason for selling—to close an estate.

W. K. CADMAN

924 N. Hillside Wichita, Kansas

LEASES—East Texas, La., South Ark 20 acres up, dollar acre up.—Owners—Address Attorney, Box 1122, Little Rock, Ark.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma, Louisiana and Illinois

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ROY G. BARTON, Hobbs, N M.

THE
OIL PROPERTIES EXCHANGE
For Sale: Many Producing Oil Properties. Royalties, Drilling Blocks, and Oil Investments of various sizes in Mid-Continent area. Contact us to Buy or Sell properties. Alexander Bldg., Tulsa, Okla.

FOR SALE

One-half interest in desirable producing property in dolomite area of the Panhandle, Hutchinson County, Texas. Well equipped and operated lease with 27 wells on 320 acres, all productive. Present owner in liquidation solicits inquiry from responsible brokers and operators interested in purchase of production on cash basis. Address

BOX A-680
The Oil and Gas Journal
Tulsa, Okla.

STRUCTURE high. Will give 1000 acres for a test well. John Gerhardt, New Berlin, Illinois.

STAFFORD COUNTY, KANSAS—Leases, block seven eighties, 560 acres, surrounded by major companies, within one half mile production. Independent owner offers at sacrifice price for quick deal. Box A-713, The Oil and Gas Journal, Tulsa, Oklahoma.

BLOCK of leases in Southwestern Oklahoma. Open for deal with parties able to drill well for acreage. Good Geology. Write Philo Dempsey, Roosevelt, Okla.

OIL DRILLERS ATTENTION: A 2,200 acre oil lease in the FAMOUS LANCE CREEK FORMATION near Lusk, Wyoming, is now available for drilling; the lease is in a proven, producing structure which has been producing oil for more than 20 years. For full details write to W. H. PINE, Faith, S. D.

FOR SALE—100-acre farm lease in Hoosier township, Clay County. Write Mrs. Margaret Tolliver, Sailor Springs, Ill.

Leases and Drilling Blocks

5,000 ACRE block, near McLouth, will farm out for well. Harry Haynes, Grantville, Kansas.

SHELBY COUNTY
Leases and Mineral
Vaughn Block: 25-acre lease, C. B. Lindsey survey, $20 per acre. 50-acre lease, Wm. Sample Survey, $12.50 per acre. 17 mineral acres, W. G. Alvice Survey, $25 per acre. ½ mineral under 75 acres, M. Dial Survey, $20 per acre. Priced for quick action. C. A. Parker, Box 451, Center, Texas.

WILL farm out lease for well; South half, Sec. 34, Township 16, Range 4 East, Dickerson Co., Kansas; Half mile from Lost Springs Production. 1078—15th Street, San Bernardino, Calif.

WE OWN THREE BLOCKS OF LONG TERM, LOW RENTAL OIL AND GAS LEASES IN ILLINOIS, EACH BLOCK CONTAINING 3000 ACRES, ALL ARE OFFERED FOR OUTRIGHT SALE AT ATTRACTIVELY LOW PRICES AND ALL MERIT INVESTIGATION. Box A-722, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE Oil and gas leases, small production, Fluorspar and Rock asphalt deposits. Reports and maps furnished on request. W. P. Harley, Bowling Green, Kentucky.

Financing

LOANS made on producing oil, gas and mineral lands. New York Note & Share Corp., 109 Broad St., New York City.

Patent Attorneys

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DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

CAPITAL SEEKERS
Put your project before 260 Key-Men. Cost trifling. Details free. AMSTER LEONARD, Fox Theater Building, Detroit, Michigan.

Help Wanted

WANTED
ASPHALT TECHNOLOGIST
Position requires man with technical degree and who has had experience in the manufacture and blending of roofing and paving asphalts. Location, middle West with medium sized oil company. Our employes know of this advertisement. Box A-711, The Oil and Gas Journal, Tulsa, Okla.

POSITION OPEN
Draftsman-Engineer for general refinery drafting, including layout of equipment, piping, towers, buildings, etc. Opportunity to advance with large independent refinery. State qualifications, experience. Box A-723, The Oil and Gas Journal, Tulsa, Okla.

WANTED
Refinery Engineer for design and construction work. Medium sized growing plant in middle west. Box A-721, The Oil and Gas Journal, Tulsa, Oklahoma.

Situations Wanted

REFINERY ENGINEER with practical, technical, and operating knowledge desires responsible job with operating company. Box A-710, The Oil and Gas Journal, Tulsa, Okla.

TO OIL Company President Somewhere: Please record my availability for geological work, coastal plain or elsewhere. I am signing off. L. D. Burling, Box 305, Waycross, Ga.

EXPERIENCED Mechanical Designer, B.S. degree, 24 years old, draft free, now employed major chemical company, wants manufacturing or refinery work. 802 W. 41 St., Houston, Tex.

Royalties

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma

WE BUY & SELL all types of Oil and Gas Royalties. Sales restricted to registered dealers only. Grimes Royalty Co., Tulsa Loan Bldg., Tulsa, Okla.

OUR READY MARKETS Enable us to pay cash for producing royalty acreage, lots, units and oil payments. GLOBE SECURITIES CO., LTD., Oklahoma City.

DEEDED ROYALTIES
State Oil & Gas Leases
Harry S. Wright, Farmington, N. M.
REGISTERED ROYALTY DEALER

Mailing Lists

ROYALTY owners, Oil investors, Unit holders, Stockholders, Operating personnel of oil industry. Oil Industry Mailing List Co., Tulsa Loan Bldg., Tulsa, Okla.

Equipment Wanted

WANTED—110-120 volt, 1½-2 KW, 60 cycle, A.C. engine-driven electric generator. Write or wire George Haley, Box 199, Casey, Ill., stating make, age, location, size, condition, and price.

WANTED good used 4, 6, 8, 10 and 12 inch pipe, plain or coupled. Write Daniel A. Moritz Co., McKeesport, Pa.

HIGHEST cash prices paid for entire plants or individual production tools, milling machines, shapers, drill-presses, lathes, punch presses, electrical equipment and motors. Write us and a representative will call. COOK COUNTY MACHINERY CO., 1132 W. Lake St., Chicago, Ill.

WANTED 2—80 ft. angle or tubular steel pumping derricks with pumping crown blocks. Quote price and location. Lucey Products Corp., Tulsa, Okla.

WANTED TO BUY all size pipe. We also buy abandoned leases. Box 574, Tulsa, Okla.

For Sale—Equipment

4—80 HP Type X Bessemer Gas Engines Direct Driven Compressors. Can furnish with 6¾" x 20" to 18" x 20" compressor cylinders. W. S. Smith, 523 Thompson Bldg., Tulsa, Okla., 2-5473.

LARGE GASOLINE PLANT being dismantled. Bessemer equipment, gas engines & other machinery, tanks, towers, regulators, meters, recording gauges, valves, tools, pipe fittings, etc. GILBERT PIPE & SUPPLY, Electra, Tex.

FOR SALE: 125 H.P. 200 W.P. Broderick Boiler, Code Condition, $975. Melton Supply Co., Seminole, Okla.

REFINERY GATE VALVES

Reconditioned and Tested
STEEL AND CAST IRON
O.S.&Y. Flanged and Screw End
ALL STANDARD MAKES
Largest Stock in Midwest
We save you half

West Tulsa Pipe and Supply Co.
L.D. 635 P.O. Box 1865
TULSA, OKLAHOMA

FOR SALE: One Worthington Horizontal Duplex Power Pump, Deane Type, Figure D-2424, size 4½ x 4½ x 10, flood lubricated, double acting pistons, with totally enclosed power end. One G-E Squirrel Cage motor, 500 series, model 15 E763, three phase, 60 cycle, 440 volts, speed 1200, with compensator and disconnecting switch. One National Transit Hot Oil Duplex Steam Pump, 10 x 4½ x 12. All the above in first class condition. Phone 920, Big Spring, Texas.

BANDWHEEL Power, 25 H.P. Superior Engine and Clutch, Belt, House, Water tank, Pump. P. O. Box 101, Tulsa. Phone 3-0469.

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Classified advertising rates: First insertion, 35 cents a line; each additional insertion, 25 cents a line, PAYABLE IN ADVANCE. Six words usually make a line. Count as a word each one-letter word and each group of figures. White-space computed at regular line rate. Allow two extra lines for blind ads. Ads of less than three lines not accepted. No formal acknowledgment is made, and proofs cannot be shown in advance of publication.

	1 time	2 times	3 times	4 times		1 time	2 times	3 times	4 times
3 Lines	$1.05	$1.80	$2.55	$3.30	7 Lines	$2.45	$4.20	$5.95	$7.70
4 Lines	1.40	2.40	3.40	4.40	8 Lines	2.80	4.80	6.80	8.80
5 Lines	1.75	3.00	4.25	5.50	9 Lines	3.15	5.40	7.65	9.90
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1 Inch	52 times	3.50 per inch

This space may be contracted for over a period of one year from the date of the first insertion and is PAYABLE IN ADVANCE, MONTHLY.

We reserve the right to withhold all advertising of questionable character. To avoid delay be sure to send remittance with copy. We will set your ad in the smallest amount of space possible and refund all overpayments. One-time insertions will not be run until fully paid. Forms close MONDAY NOON before each issue date.

THE OIL AND GAS JOURNAL

Tulsa, Oklahoma

WANTED TO BUY—REFINERY EQUIPMENT

Oil Storage Tanks—Pressure Vessels—Valves and Fittings

Send Us Your Lists of Surplus Equipment

OFFERING FOR IMMEDIATE SALE

3—24 by 5 by 24 Worthington Simplex Hot Oil Pumps

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry or H. J. Galamba
Riverview at Second, Kansas City, Kansas

Robt. W. Duden
2100 S. Union, Tulsa, Oklahoma

FOR SALE: 1—F-M 4" Centrifugal Pump and 10 h.p. 1200 rpm. motor. One Viking ET 4" high pressure rotary pump with 2¾ to 1 speed reducing gear. One 4" Worthington high pressure rotary pump. Miscellaneous lot pumps and electric motors with starters. One 125 g.p.m. deep well turbine with 320 feet column, motor or gas engine drive. Priced to sell.
CORKEN PUMP & MACHINERY CO.
206 E. Grand Ave., Oklahoma City, Okla.

---

25 K.W. and 40 K.W. Gas Engines, 220 volts. D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St., Cincinnati, Ohio

FOR SALE: WILSON Double Drum Well Servicing Unit with spudder attachment. Melton Supply Co., Seminole, Okla.

FOR SALE—ABSORBERS—3—72" x 30' Southwestern Make 16 trays 75# W.P. W. S. Smith, 523 Thompson Bldg., Phone 2-5473, Tulsa, Okla.

FOR SALE: 1 mile of 4" Standard line pipe 30c. 1 mile of 3" Standard line pipe 20c. 1 mile 5¼" line pipe 25c. All plain end, straight, 37' lengths ready to lay in line. M. J. Regan, Coffeyville, Kans.

FOR SALE: 250 lengths of 5½" OD 4¾" ID Kellogg Tubes. Average length 35'. 35 Joints Lapweld Carbon Steel Pipe 15" OD, 12¾" ID, average length 12' long. American Pipe & Supply Co., Casper, Wyoming.

TRACTORS

Caterpillars, crawler type, size "35" $395; size "65" with nigger head winch $795.00; Austin Western hydraulic grader 10' blade $650. O. C. Evans, Mt. Sterling, Kentucky.

FOR SALE—GAS COOLERS: 2—480'-240' Southwestern make low pressure completely overhauled $1.00 per sq. ft. W. S. Smith, 523 Thompson Bldg., Tulsa, Okla. Phone 2-5473.

9—3' x 40' x ⅝" head x ½" thick shell, double riveted and butt strapped, practically new concave and convex heads.
8 as above, except ¾" heads, ⅝" shell.
10 as above except ½" heads, ½" shell and no butt straps. Make excellent butane storage tanks, as they have been tested for butane storage.
2—12 x 5 x 18 Wilson-Snyder piston type, duplex, hot oil pumps, stainless steel, wing guided valve and seats.
1—5' x 30' x ⅞" head, ¾" shell, double riveted, convex head, mill scale still on vessel—A-1 condition.
300—2" Vogt screw end #4508—600#—plug stem valves.
All above subject to prior sale. Items f.o.b. Beaumont, Texas, area.
Other items such as steel series valves, steam duplex and simplex pumps, butane or close clearance pumps, centrifugal pumps and rotary pumps—viscuous liquid, also turbines—23 H.P. to 150 H.P.
BUYERS SERVICE & ENGINEERING COMPANY
Box #552 West Tulsa or
31 N. Peoria, Tulsa, Oklahoma
Phones 2-4441 or 2-3181

FOR SALE at Oklahoma City: A quantity of repaired and unrepaired duplex piston steam pumps, 6 x 4 x 6 and 10 x 3½ or 4½ x 10. Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: Pressure vessel with working pressures up to 135 pounds. Size: lengths 31 feet 8 inches, diameter 8 feet. Harvey Brothers, 706 Rudd, Canon City, Colorado.

FOR SALE: Two sets (8 each) cast heads for 8 cylinder, Superior diesel electric engine. Galoob Iron & Metal Co., Healdton, Okla.

SKIMMING plant refinery for sale: 1800 bbl. capacity, located in Centralia, Ill. Write Arthur C. Stone, Evansville, Ind.

IMPROVED N Sullivan Core Drill equipped with 35' mast, power pumping unit ready to go. Priced to sell. Healdton Machine Tool Co., Healdton, Okla.

DERRICKS—66's and 74's—Heavy duty tubular derricks complete with crown blocks. All in strictly A-1 condition. Al Brown Supply Co., Box 841, Kilgore, Tex.

FOR SALE at Oklahoma City: Large quantity 65, 70, 75 and 85 hp. oil field boilers, repaired and unrepaired. Cities Service Oil Co., Bartlesville, Okla.

Sucker Rods, once run, in Okla. City field. Complete stock ¾", ⅞" and 1", available in truck loads of 10,000 ft. or more. These rods all alloyed, price 15c per foot, delivered at reasonable point. Stock carried at Okla. City and Wichita, Kan.
MIKE TRAVIS
1702 S. Boulder Tulsa, Okla.

FOR SALE: 6 x 16 Wilson-Snyder Power Slush Pump. Melton Supply Co., Seminole, Okla.

FOR SALE—One Thrift Hydraulic Pipe Pulling Outfit, in A-1 Condition, complete with 5", 6", 8" and 10" slips, mounted on truck, F. O. Wilkins, 201 Commerce Building, Mount Pleasant, Michigan.

OFFER for immediate delivery, FOB Okla. Points, subject to prior sale, approx. 20,000' 8⅝" OD PE Bev. for Weld in Dbl. Rand. lgths. 17 & 20# per foot and 7,500' 10" OD PE Bev. for Weld in Dbl. Rand. lgths. 19# per foot. Box A-724, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE—1PA 100 Int. motor with full equipment, 110 HP almost new. $1500, f.o.b. Salem. Box 278, Salem, Ill.

FOR SALE—5½ Keystone self-propelling drilling machine complete with tools. Excellent condition. Chas. Stoskopf, 138 Ida St., Allegan, Mich.

FOR SALE: 5 x 12 Oil Well Power Slush Pump with 100 H.P. Waukesha Motor. Melton Supply Co., Seminole, Okla.

FOR SALE: New #5 Keystone Rig, 1400' new ¾ cable, 1400' new sand line, 2 strings of tools, 10-20 International Motor. Ralph Langston, Sr., c/o Burns & McDonnell Co., Neosho, Mo.

FOR SALE OR RENT: Gas engine powered Rotary Drilling Rig complete Suitable for 4,500' drilling. Box 1360, Phone 312, Seminole, Okla.

YOUR dependable and cheapest source of supply!
Tank & Freight Cars; any kind
Tank & Freight Car Repair Parts;
Locomotives; All Kinds
Relaying Rails
Perhaps we can supply your requirements and—immediately!
OTHER MACHINERY AND EQUIPMENT TOO!
(Destination inspection if desired!)
IRON & STEEL PRODUCTS, Inc.
36 years' experience
13412 S. Brainard Ave., Chicago, Ill.
"Anything containing IRON or STEEL"
Ask to be placed on our various mailing lists and request our popular blue WEAREVER Pencil.

NO. 23 STAR Drilling Machine, no boiler or tools; price $300.00. No. 25 Armstrong Special Drilling Machine with tools; price $550.00. Located near this city. Joel Bailey, 309 Grein Bldg., Evansville, Ind.

FOR SALE: Gas Meters. Orifice and Positive. George R. Milner, Box 457, Okmulgee, Oklahoma.

LIQUIDATING

RODESSA REFINERY
SHREVEPORT, LA.

AVAILABLE IMMEDIATE DELIVERY

This refinery contains the most modern Cracking, Topping, Butane, Naphtha, Stabilization, Absorption, and Clay Treating Units. In 1938 nearly the entire plant was rebuilt and modernized which included refinery equipment of latest design for High Pressure processing. After new installations were completed, this plant operated only a short time. Careful inspection has shown nearly all units in good operating condition. This property should not be confused with ordinary abandoned or obsolete refineries. Cracking capacity, 6,000 barrels; total processing, nearly 12,000 barrels. Storage tank capacity, over 650,000 barrels. Write for complete detailed inventory.

BROWN-STRAUSS CORPORATION

AT (CEDAR GROVE) SHREVEPORT, LA.
PHONE 7-7334
LEONARD STRAUSS, Resident Engineer

MAIN OFFICE: KANSAS CITY, MO.
LONG DIST. PHONE 169
HARRY B. STRAUSS, Manager

FOR SALE
For Immediate Delivery

Two New 26# Natural Gasoline Storage Tanks of 25,000 gallons capacity each, 10' diameter by 40' long shell with hemispherical heads, complete with 3' high support saddles, all necessary connections, tanks built in accordance API-ASME code of new material in Setepmber 1941, have never left fabricating plant and may be inspected before shop painted. Price f.o.b. Shreveport, Louisiana, $3,100.00 each.

BOX A-270

The Oil and Gas Journal, Tulsa, Oklahoma.

30,000 Ft. good used 2" Tubing, 5½", 6¼, 6⅝, 8 and 10" casing. Daniel A. Moritz Co. Phone McKeesport, Pa., 9191.

FOR SALE—5½ Keystone Spudder complete with tools. In good condition. F. R. Wade, 400 Choctaw, Bartlesville, Ph. 26.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

Ranches—Farm Lands

LOUISIANA Farm for sale. Six adjacent counties producing oil. Recently leased for oil or gas for 5 years. 1026 acres of land. Fields fertile, timber (Hard Woods). Lease and ½ mineral rights go to buyer. Bisected by paved state highway. 150 miles NW of New Orleans. Reason for wanting to sell is illness. For inquiries, Address A. V. Boutte, Jr., 2536 S. Galvez St., New Orleans, La.

WESTERN RANCHES—500,000 acres, or smaller. State where wanted. No lists. HOWARD INGRAM, Perrine Bldg., Oklahoma City, Okla.

7000 acre ranch eastern Colo., well watered good grass, $4.50 per acre.
1600 acre ranch, $3.50 per acre, will consider lease for oil.
480 acres nice farm land in best Stevens Co., Kans., gas area, $6000. $1200 will handle.
Write Guy Speakman,
Liberal, Kans.

Legal Blanks

BURKHART'S legal blanks and general forms serving Mid-Cont. oil field since 1908—Okla. Kans. N. Mex. Tex. Ala. Ark. Fla. Ga. Ill. Ind. Ky. La. Mich. Miss. Mo. Neb. N. Dak. Tenn. Wyo. Free catalog samples on request. Burkhart Ptg. & Sta. Co., 115 S. Cinn., Tulsa, Oklahoma.

Selected Crude Prices

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.19
Smackover, Arkansas, heavy	.83
Illinois basin	1.37
Pecos County, Texas	.95
Lance Creek, Wyoming	1.12
Bradford, Pennsylvania	2.75

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity	Signal Hill Calif.	Okla. homa, Kansas	Gulf Coast, Texas	West Texas, Lea County, N. M.
18-18.9	$0.80	...		
19-19.9	.84		$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	...	1.07	1.30	.94
32-32.9	...	1.09	1.32	.96
33-33.9	...	1.11	1.34	.98
34-34.9	...	1.13	1.36	1.00
35-35.9	...	1.15	1.38	1.02
36-36.9	...	1.17	1.40	1.04
37-37.9	...	1.19	1.42	1.06
38-38.9	...	1.21	1.44	1.08
39-39.9	...	1.23	1.46	1.10
40 and above	...	1.25	1.48	1.12

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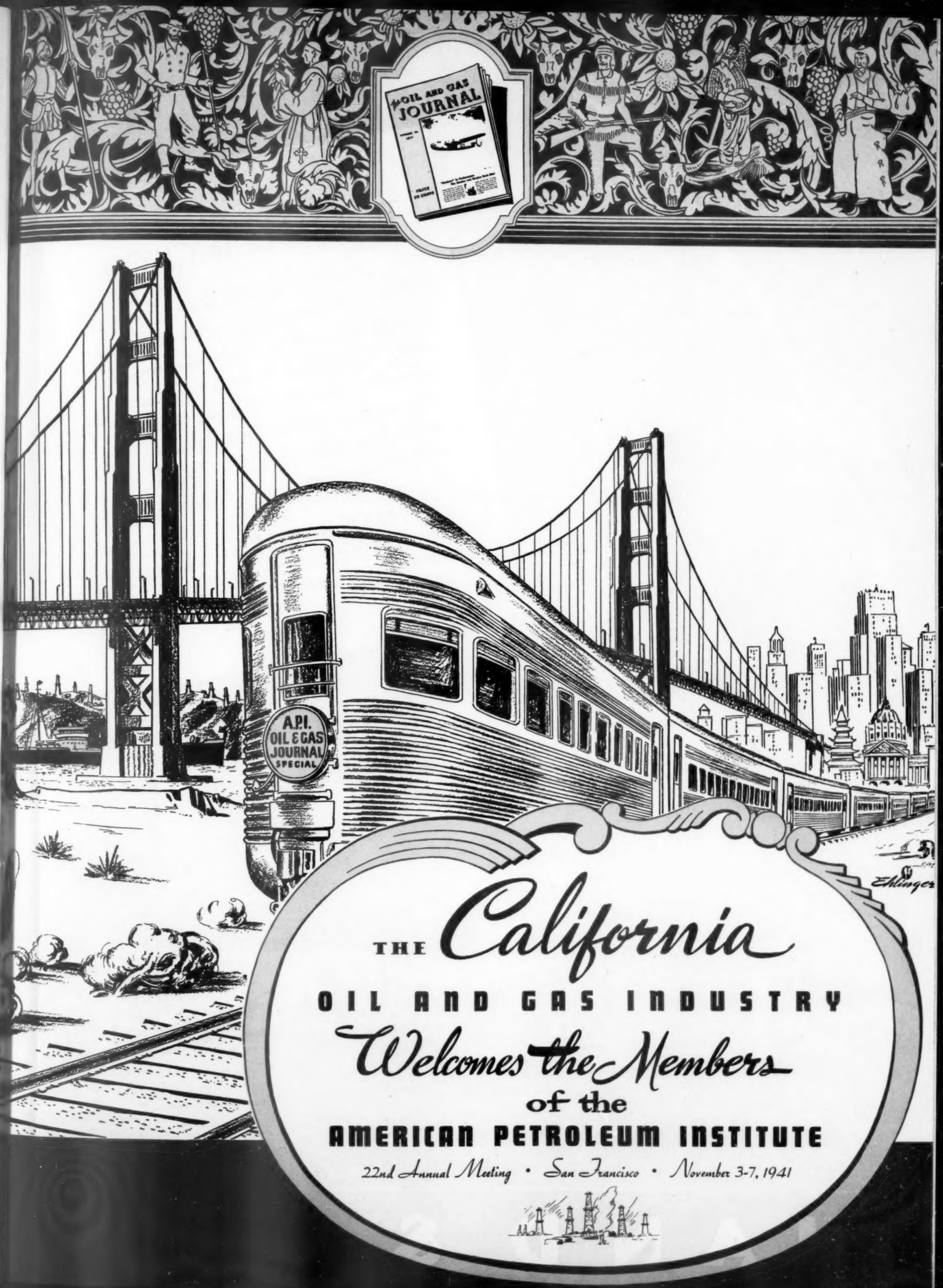
Young Engine Co.
Young Radiator Co.
Youngstown Sheet & Tube Co. Inside Back Cover

Z
Zink, John, Co.

The Oil Man's Calendar appears on Page 28



THE *California*

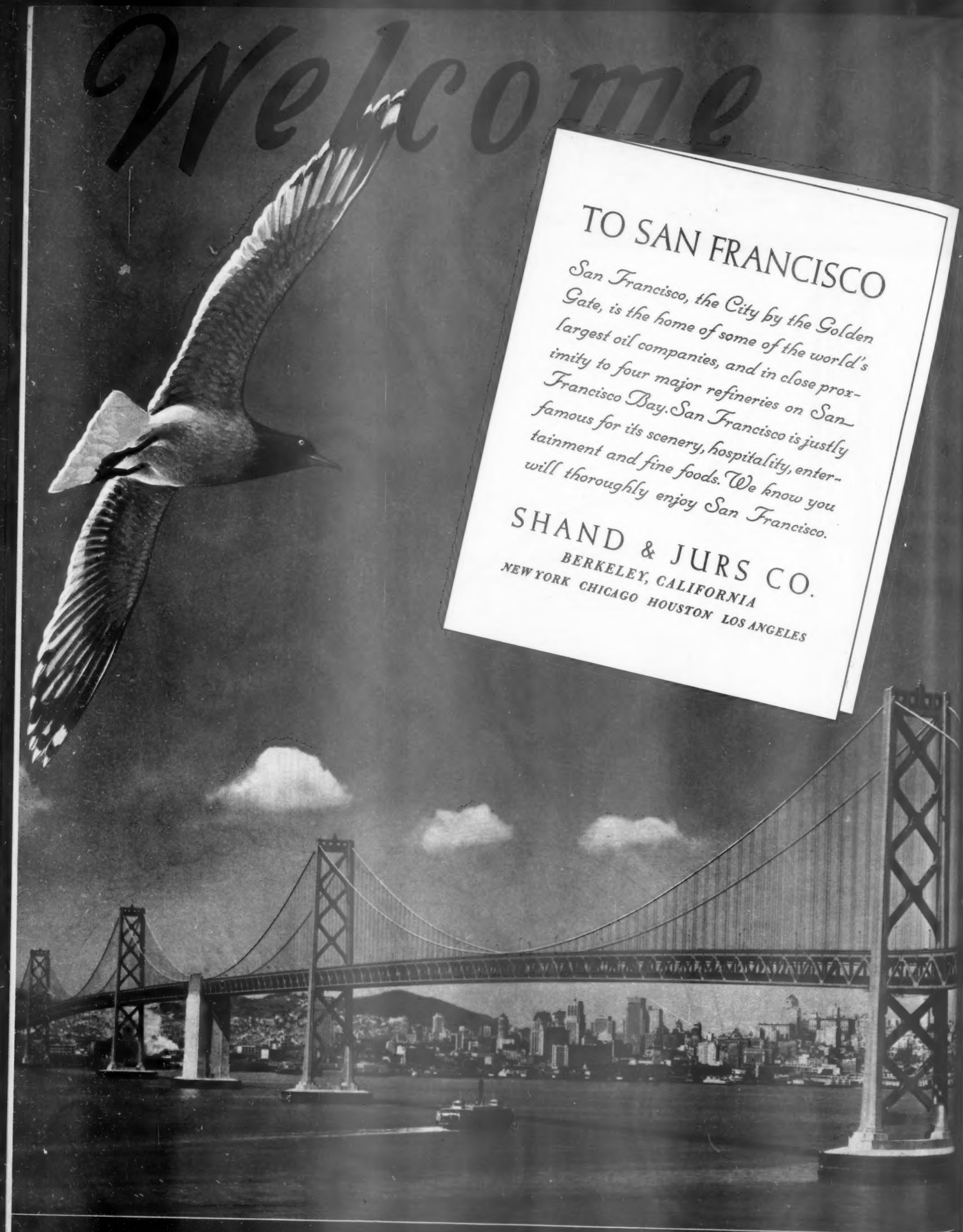
OIL AND GAS INDUSTRY

Welcomes the Members

of the

AMERICAN PETROLEUM INSTITUTE

22nd Annual Meeting • San Francisco • November 3-7, 1941

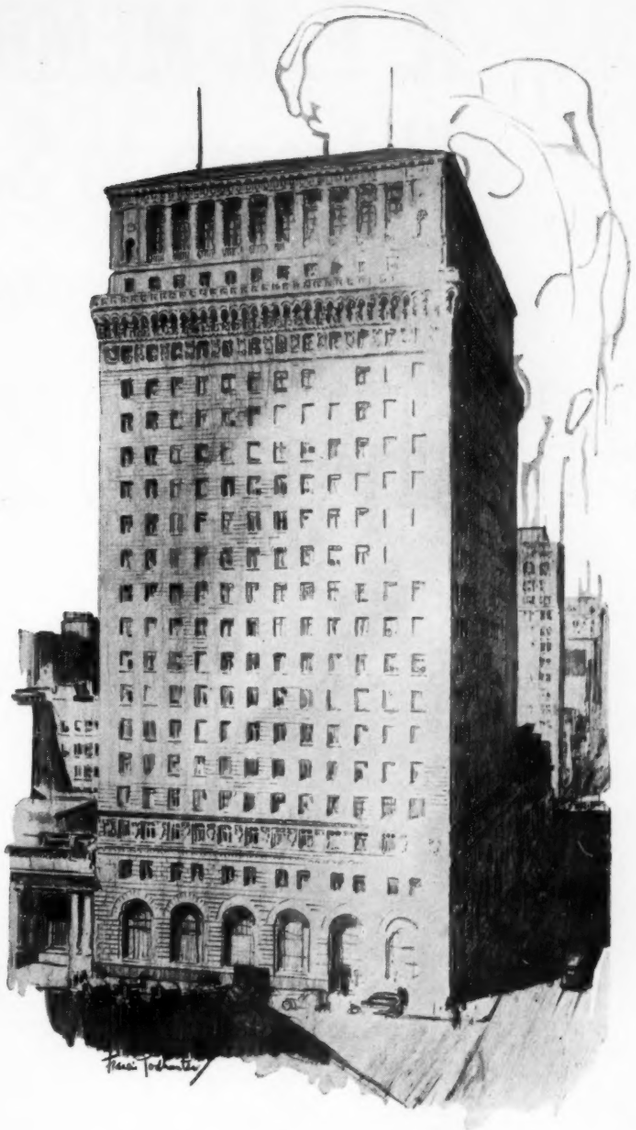

Welcome
TO SAN FRANCISCO
San Francisco, the City by the Golden Gate, is the home of some of the world's largest oil companies, and in close proximity to four major refineries on San Francisco Bay. San Francisco is justly famous for its scenery, hospitality, entertainment and fine foods. We know you will thoroughly enjoy San Francisco.
SHAND & JURS CO.
BERKELEY, CALIFORNIA
NEW YORK CHICAGO HOUSTON LOS ANGELES
SHAND & JUR

Home Offices
STANDARD OIL COMPANY OF CALIFORNIA
BUSH AND SANSOME STREETS
San Francisco

Delegates to the American Petroleum Institute Annual Meeting and their friends are cordially invited to visit our San Francisco offices and organization.

A reception room on the 20th floor provides an interesting view, and is available for visits with friends, resting, and letter-writing.

The Travel Bureau on the ground floor will gladly assist in planning trips and furnishing information.



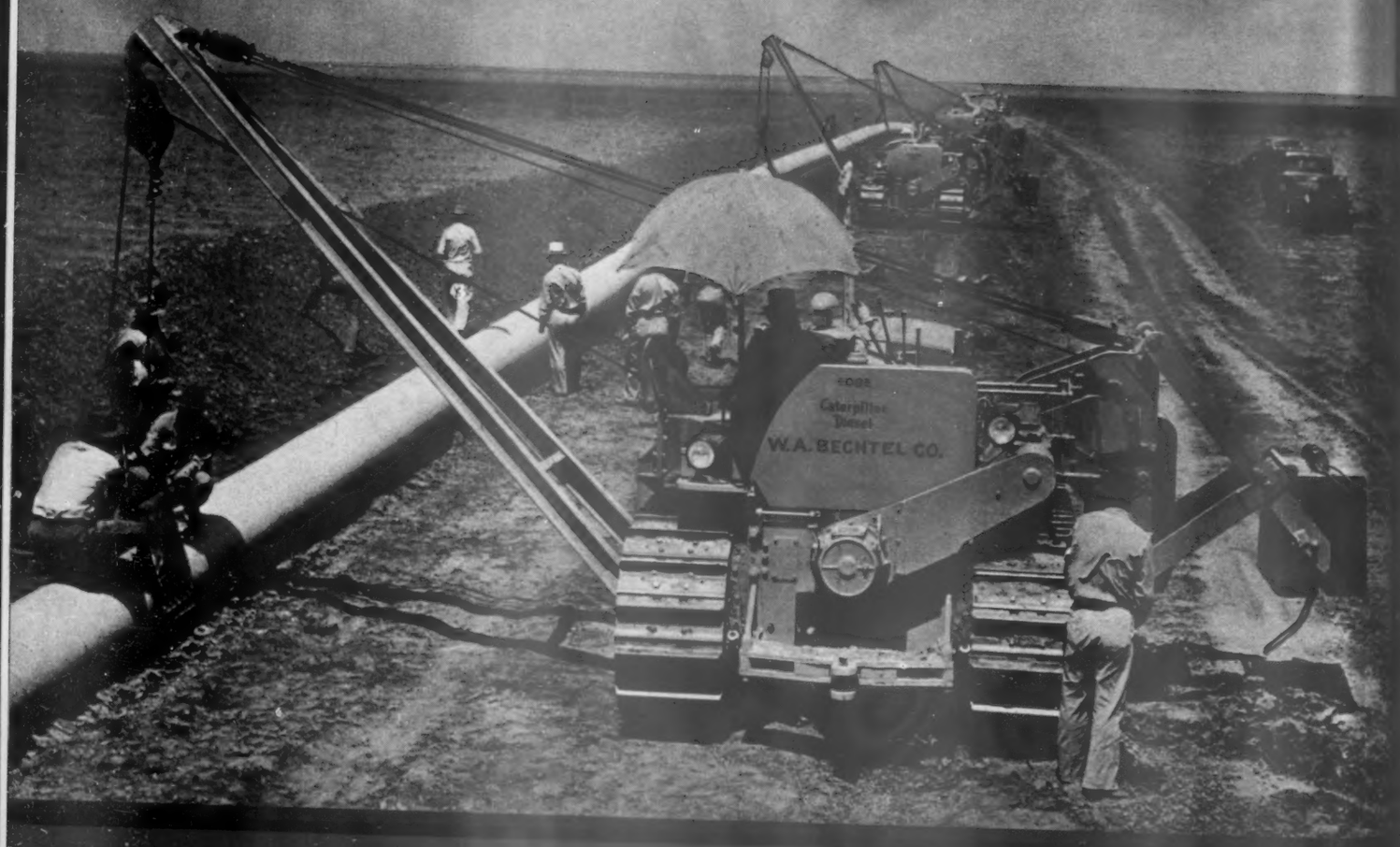
A WORD OF WELCOME

To all attending the Twenty-Second Annual Meeting of the American Petroleum Institute, we extend a most cordial welcome. Not only we ourselves, but all San Francisco and all California unite in wishing for you a most profitable and enjoyable occasion. Especially in your hours of leisure, we all hope to be of some service to you.

STANDARD OIL COMPANY OF CALIFORNIA

A. P. I. MEMBERS...
Welcome to San Francisco

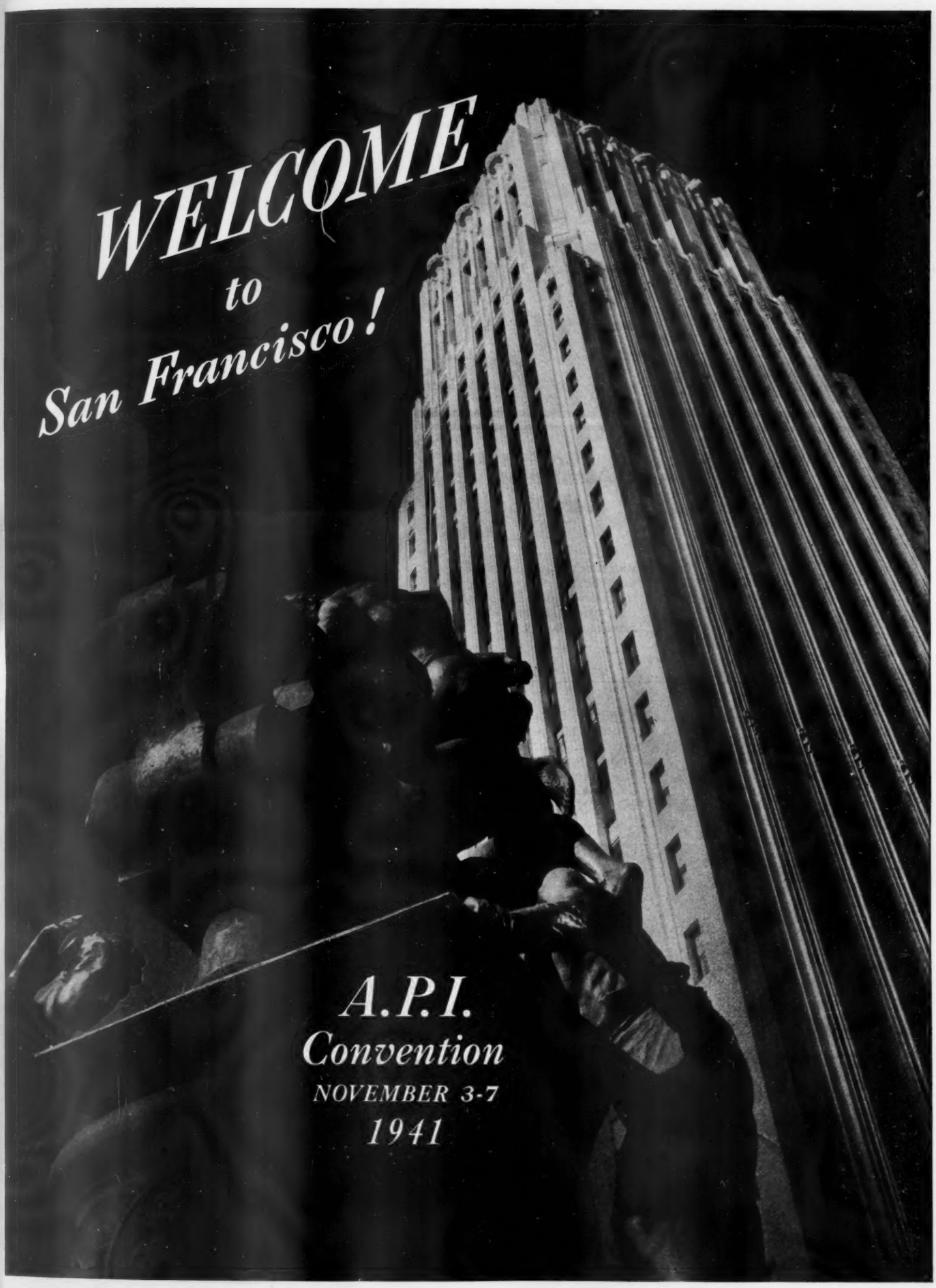
PIPE LINE CONSTRUCTION



W. A. BECHTEL CO.

GENERAL
CONTRACTORS

San Francisco


WELCOME
to
San Francisco!
A.P.I.
Convention
NOVEMBER 3-7
1941

WELCOME A.P.I.

The Tide Water Associated Oil Company welcomes you to San Francisco . . . . the home city of its Associated Division

Ride the quaint cable cars that climb San Francisco's storied hills. It's a thrill you'll get only in San Francisco.

Visit the largest Chinese settlement outside the Orient. Here are the narrow streets and alleys and the pagoda roofs of Canton.

Colorful Fishermen's Wharf. A bit of the Mediterranean transplanted to San Francisco Bay. Taste the fresh-caught crab boiled in a sidewalk caldron.

Dine around the world in famous San Francisco restaurants. Whatever your mood, San Francisco will not disappoint you.

Drive the world's longest single span on the Golden Gate Bridge and the 8-mile Bay Bridge. There are many interesting places to explore just beyond the bridges.

Over the week-end listen to Associated's famous football sportcasts. This is Associated's 16th consecutive year of sportcasting here in the West.

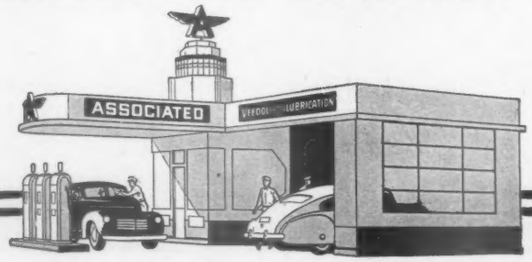
Smiling Associated Dealers are accustomed to directing visitors to San Francisco's places of interest.

"It's Another Friendly Associated Service"

TIDE WATER ASSOCIATED OIL COMPANY

Refiners and marketers of

ASSOCIATED AVIATION ETHYL GASOLINE
FINER "FLYING A" GASOLINE
VEEDOL & TYDOL MOTOR OILS



LUNKENHEIMER

Fig.1878

FOR STEAM—WATER—AIR
GASOLINE—OIL SERVICE

—•—

Available from Lunkenheimer distributors in all oil centers

Fig.1430

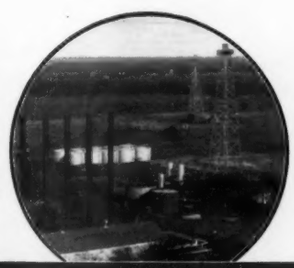


Fig.1938

Ask for Catalog 78 and handy "Guide" for selecting Valves, Boiler Mountings and Lubricating Devices. Your Lunkenheimer distributor will gladly supply you.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

Pioneers IN

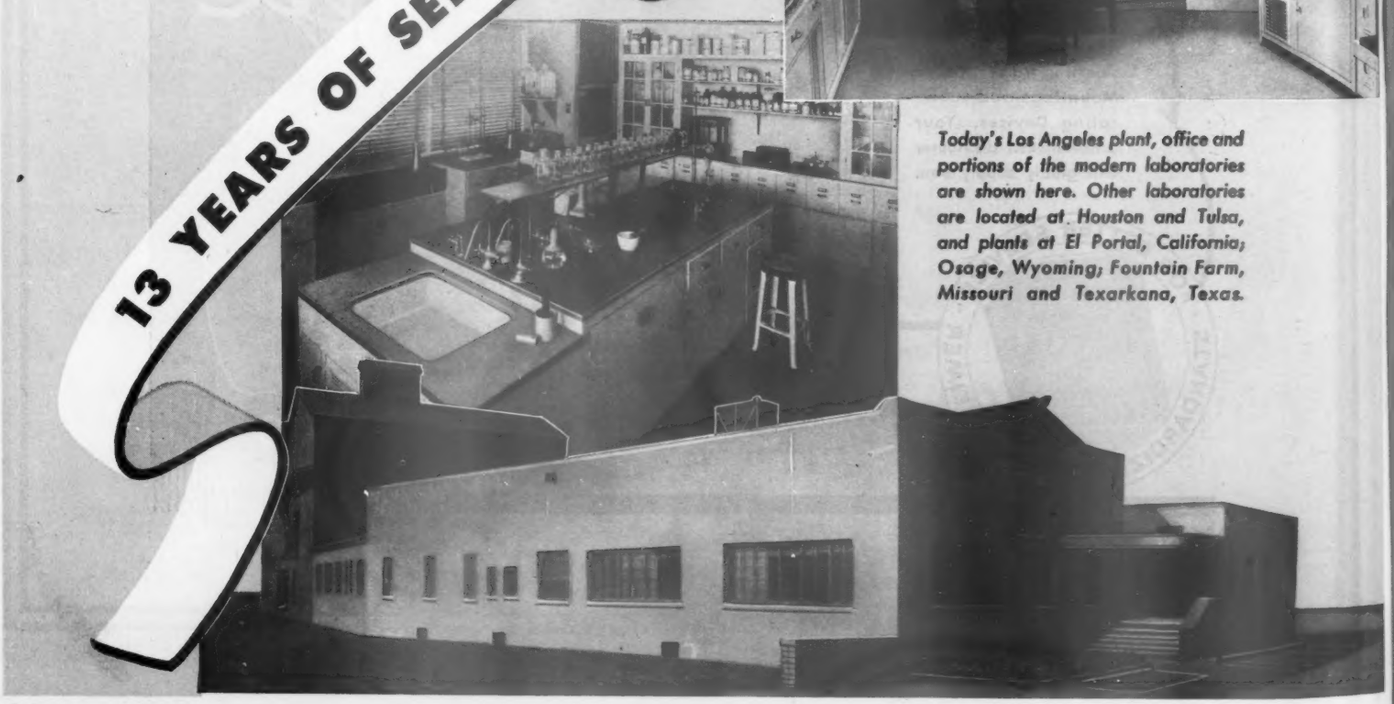
1928

1941

13 YEARS OF SERVICE TO THE OIL INDUSTRY

In this small plant and laboratory at Los Angeles, Baroid pioneered in the prevention of drilling mud troubles.

Today's Los Angeles plant, office and portions of the modern laboratories are shown here. Other laboratories are located at Houston and Tulsa, and plants at El Portal, California; Osage, Wyoming; Fountain Farm, Missouri and Texarkana, Texas.



PREVENTING DRILLING MUD TROUBLES

Since 1928, BAROID SALES DIVISION'S COMPLETE MUD SERVICE HAS CONTRIBUTED TO FASTER, SAFER, MORE ECONOMICAL DRILLING

Practically all of the important developments in drilling mud technique have taken place since 1928, when National Lead Company introduced Baroid to the oil industry. Since that date, there has been a steady development and improvement in the materials, the testing equipment and the technique of utilizing drilling mud in the drilling and control of oil wells. It is conceded today that it would be impossible to drill many deep wells if it were not for present-day knowledge of mud technique and present-day improved materials and testing equipment.

Many oil company engineers, and others interested in the drilling of oil wells, have contributed to the developments which have solved the numerous drilling mud problems and made present-day drilling mud technique possible.

National Lead Company takes pardonable pride in having pioneered these developments and in having materially assisted in the solution of these problems.

BAROID SALES DIVISION
NATIONAL LEAD COMPANY
BAROID SALES OFFICES: HOUSTON • LOS ANGELES • TULSA

BAROID PRODUCTS

BAROID and COLOX—Drilling Mud Weighting Materials.
AQUAGEL—Gel-Forming Colloidal Drilling Clay.
FIBROTEX—For Regaining or Preventing the Loss of Circulation.
BAROCO—A Salt-Water-Resisting Drilling Clay.
STABILITE—A Chemical Mud Thinner.
AQUAGEL-CEMENT—For Recovering Lost Circulation and Cementing Casing.
SMENTOX—For Counteracting the Effects of Cement Contamination and for Reconditioning Cement-Cut Mud.
ZEOGEL—Used as a Suspending Agent When High Concentrations of Salt or Salt Water Are Encountered.
IMPERMEX — A Concentrated Colloidal Additive Agent for Reducing Water Loss in Salt-Laden Muds.
MICATEX—For Reducing Water Loss to the Formation and for Overcoming Mild Cases of Lost Circulation.
TESTING EQUIPMENT—For Drilling Mud Analysis and Control.
BAROID WELL LOGGING SERVICE—Formation Information Thru Mud Analysis

Materials

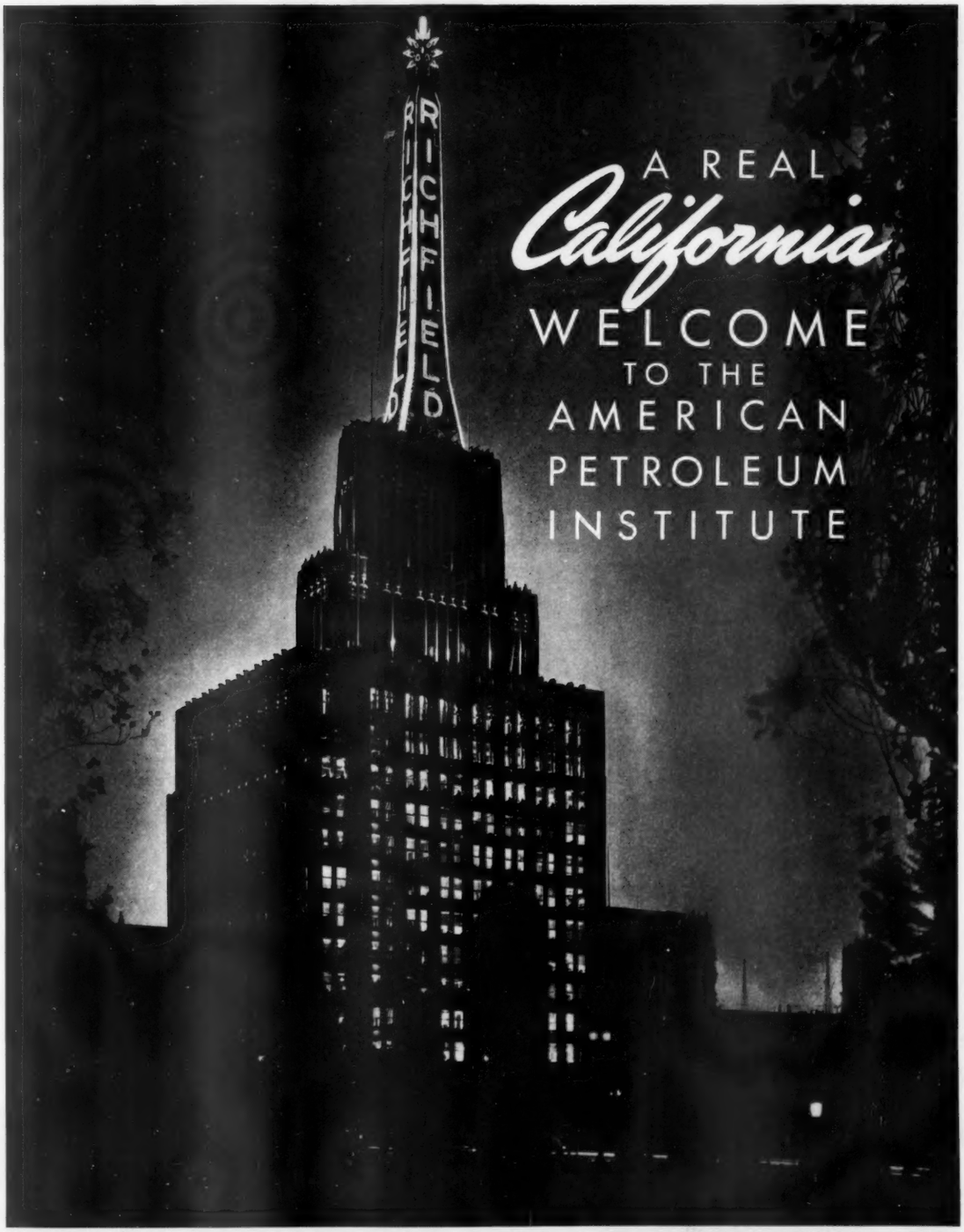
ARE THE PROBLEM TODAY

THE experience gained in purchasing and expediting hundreds of millions of dollars worth of materials and equipment for Petroleum Refineries, Chemical Plants, and Defense Projects of the United States Army, Navy, and Maritime Commission has placed us in a position to be of real service to you in these critical times.

BECHTEL-McCONE-PARSONS CORPORATION

Engineers & Constructors

LOS ANGELES • SAN FRANCISCO


RICHFIELD
RICHFIELD
A REAL
California
WELCOME
TO THE
AMERICAN
PETROLEUM
INSTITUTE

RICHFIELD

BAKER, too,

View of Old Los Angeles Field, 1895.

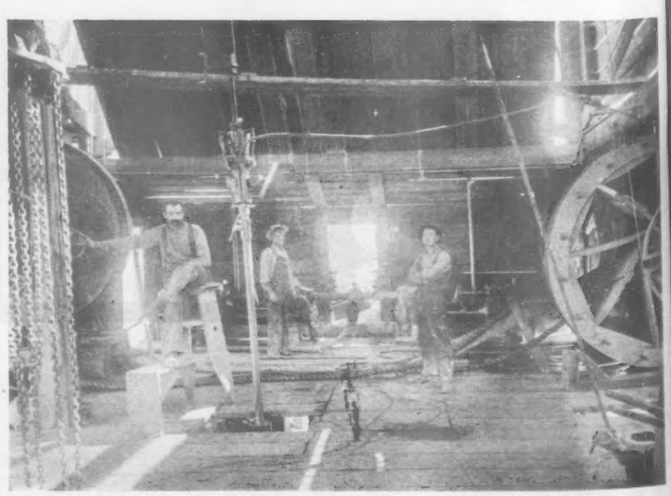
Another view of Doheny & Cannon Pumping Plant No. 2. Group includes (starting second from left) Mart Barber, Proudfoot, Tom Pryor, Roy Frick, R. C. Baker (with hand on boiler).

Doheny & Cannon Pumping Plant No. 2, Old Los Angeles Field, 1895. R. C. Baker standing at left.

Coalinga Syndicate Oil Company Well No. 5A, 1911. Morning tower crew (left to right): Ribard, Hatfield, Burress.

BAKER OIL TOOLS INC. BAKER SERVING THE WORLD

Welcome to California



remembers when Oil in California was still news

OCCASIONALLY the oil industry pauses to take a quick look over its shoulder at those days familiarly known as "way back when." In doing so, it certainly must view with considerable pride and feeling of accomplishment the vast industry that has since been developed largely through individual foresight, initiative, and enterprise.

This retrospection presents a particularly interesting picture to us, one reason being because Mr. R. C. Baker, president and founder of Baker Oil Tools, Inc., himself took an active part in this development work.

Like many other well-known figures and personalities in the oil industry, Mr. Baker's early experience was gained in the field as a driller-contractor-operator, first in Los Angeles and later in the San Joaquin Valley. To supply the oil industry with many of his important inventions (the famous Baker Casing Shoe in 1907), he subsequently entered the equipment manufacturing phase of the business, starting in 1913 with a small manufacturing shop at Coalinga, Calif.

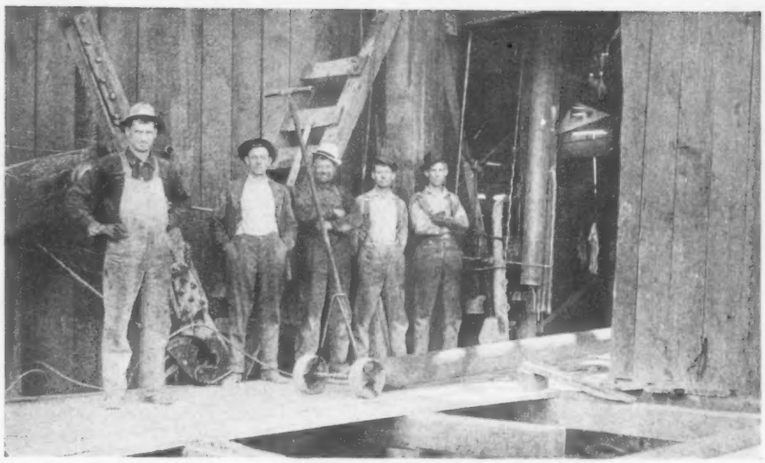
The pictures herein reproduced are scenes from these early days. They are taken from Mr. R. C. Baker's private file, and we feel are interesting for both their personal as well as historical background.

While Mr. Baker made his start, and Baker Oil Tools, Inc. also had its inception in California, activities have not been confined to this territory. Rather, tools and devices bearing the now famous Baker trade mark have, for more than thirty years, played an important part in the development of every oil-producing territory throughout the world.

In addition to the original shop at Coalinga, California, manufacturing plants are today maintained at Los Angeles, Houston, and St. Louis, with service offices and branch warehouses located at key points in California, the Gulf Coast, Mid-Continent, Illinois, and Rocky Mountain territories.

Thus, on this occasion, Mr. R. C. Baker, the individual, looks back with pleasure... and Baker Oil Tools, Inc., the institution, looks forward with confidence.

BAKER OIL TOOLS, INC.



Coalinga Syndicate Oil Company Well No. 3A (1911). Left to right: Tom Walker, William Lair, Ross Cadwell, Bascom Pryor, Clem Ibert.

Another view of Coalinga Syndicate Oil Company Well No. 3A. Completed October 15, 1941, at depth of 2421 feet for a 200-barrel well. Left to right: R. L. Peeler, R. C. Baker, Clem Ibert.

Automobiles waiting for arrival of Los Angeles Business Men's Special—Coalinga, California, 1907.

Emblem of Quality

From Coast to Coast the Red Flying Horse distinguishes the conveniently located vendors of high quality automotive products including—

MOBILGAS

AMERICA'S FAVORITE GASOLINE

GENERAL PETROLEUM CORPORATION OF CALIFORNIA

A Socony-Vacuum Company

WHEN

Performance

COUNTS YOU'LL FIND H.C. SMITH ROCK BITS *DOING THE JOB*

FASTER CUTTING ACTION

is assured by scientific design of cutters and teeth.

STRAIGHTER FULL GAUGE HOLE

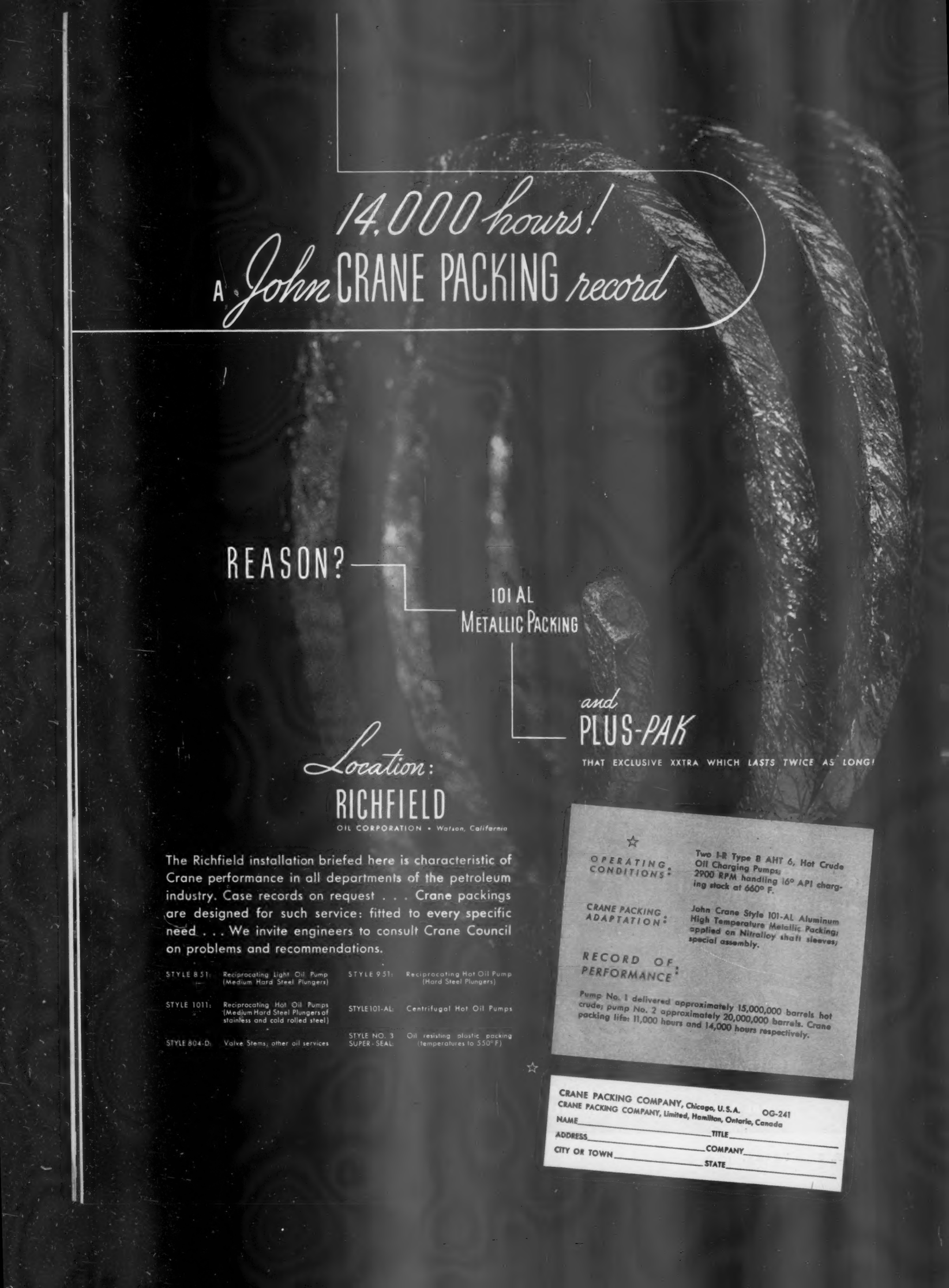
is guaranteed by 45-degree angle gauge cutter teeth.

H C Smith Oil Tool Co.

GENERAL OFFICES AND PLANT - P. O. BOX 431, COMPTON, CALIF.

Export Representative:

VAL R. WITTICH · 30 ROCKEFELLER PLAZA · NEW YORK, N. Y., U. S. A.



14,000 hours! A John CRANE PACKING record

REASON?

101 AL METALLIC PACKING

and

PLUS-PAK

THAT EXCLUSIVE XXTRA WHICH LASTS TWICE AS LONG!

Location:

RICHFIELD

OIL CORPORATION • *Watson, California*

The Richfield installation briefed here is characteristic of Crane performance in all departments of the petroleum industry. Case records on request . . . Crane packings are designed for such service: fitted to every specific need . . . We invite engineers to consult Crane Council on problems and recommendations.

STYLE 851:	Reciprocating Light Oil Pump (Medium Hard Steel Plungers)	STYLE 951:	Reciprocating Hot Oil Pump (Hard Steel Plungers)
STYLE 1011:	Reciprocating Hot Oil Pumps (Medium Hard Steel Plungers of stainless and cold rolled steel)	STYLE 101-AL:	Centrifugal Hot Oil Pumps
STYLE 804-D:	Valve Stems, other oil services	STYLE NO. 3 SUPER-SEAL:	Oil resisting plastic packing (temperatures to 550° F)

☆

OPERATING CONDITIONS: Two I-R Type B AHT 6, Hot Crude Oil Charging Pumps; 2900 RPM handling 16° API charging stock at 660° F.

CRANE PACKING ADAPTATION: John Crane Style 101-AL Aluminum High Temperature Metallic Packing; applied on Nitralloy shaft sleeves; special assembly.

RECORD OF PERFORMANCE:

Pump No. 1 delivered approximately 15,000,000 barrels hot crude; pump No. 2 approximately 20,000,000 barrels. Crane packing life: 11,000 hours and 14,000 hours respectively.

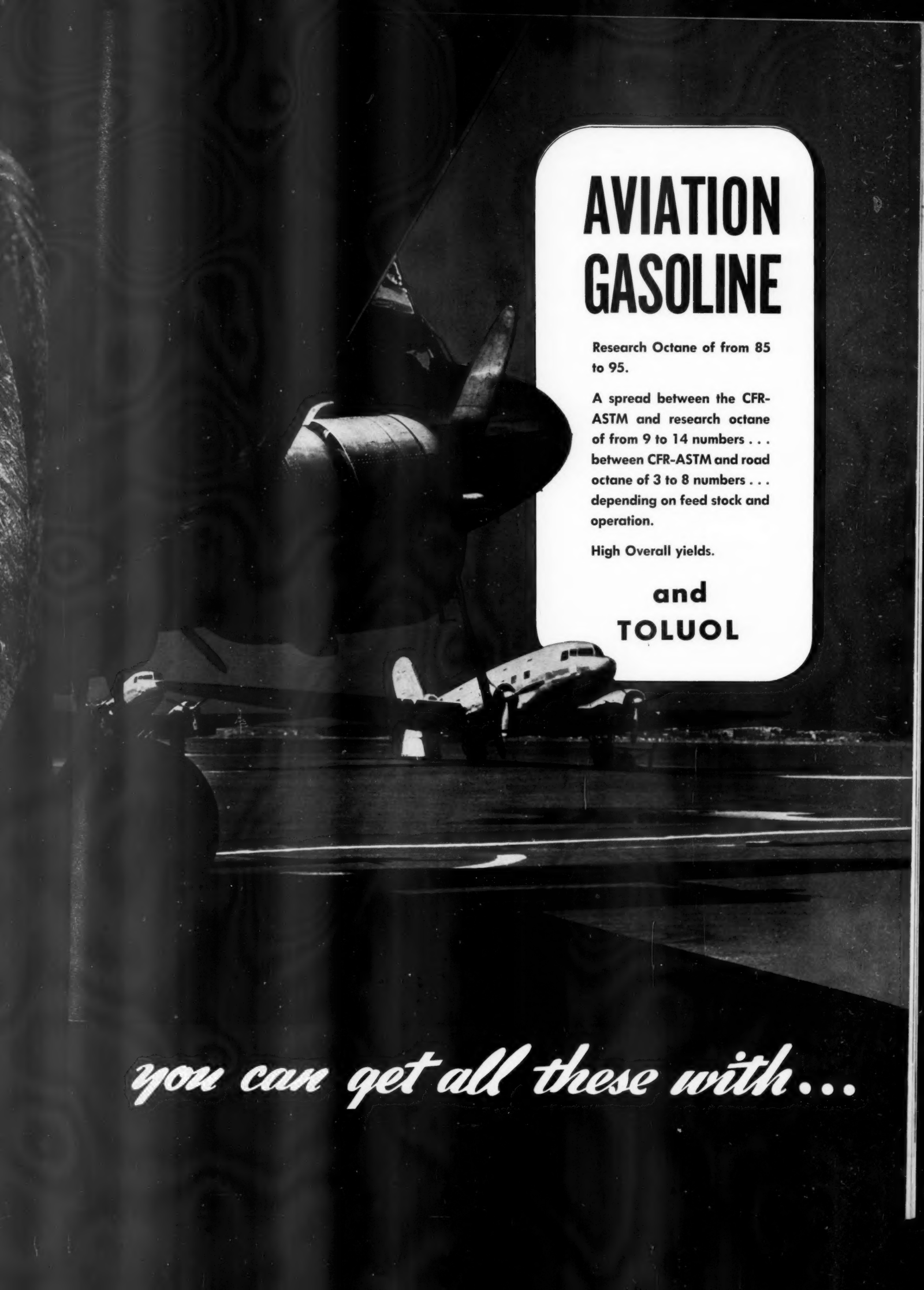
☆

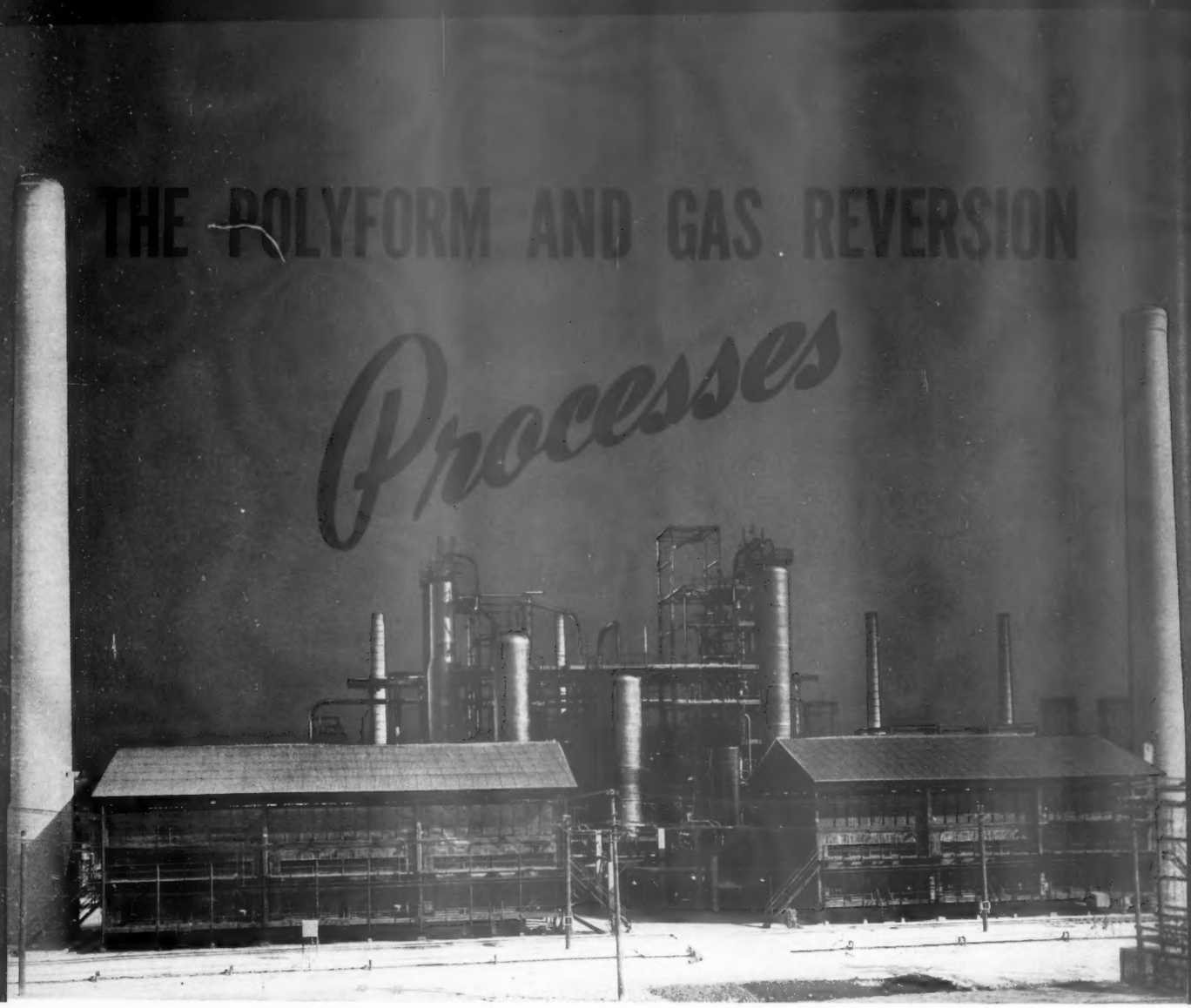
CRANE PACKING COMPANY, Chicago, U.S.A. OG-241
CRANE PACKING COMPANY, Limited, Hamilton, Ontario, Canada

NAME _____ TITLE _____

ADDRESS _____ COMPANY _____

CITY OR TOWN _____ STATE _____


AVIATION
GASOLINE
Research Octane of from 85 to 95.
A spread between the CFR-ASTM and research octane of from 9 to 14 numbers . . . between CFR-ASTM and road octane of 3 to 8 numbers . . . depending on feed stock and operation.
High Overall yields.
and
TOLUOL
you can get all these with...



HIGH OCTANE GASOLINE FROM OIL STOCKS, BUTANES AND PROPANES

Lummus Polyform and Gas Reversion Units, designed, built and licensed under patents of the Gulf Oil Corporation and Phillips Petroleum Company, produce high octane gasoline with low specific gravity fuel gas from *all* cracking stocks.

When applied to gas oils or reduced crudes, it is possible to get conversions per pass approximately double those obtained by conventional cracking. Full crudes may be selectively cracked. Non-residuum full coking operations may be obtained, if desired.

In operation and under construction are fifteen Polyform-Gas Reversion plants with a total fresh feed charge of 89,000 barrels of oil, propanes and butanes.

Write for complete data on Polyform and Gas Reversion Processes.

THE LUMMUS COMPANY, 420 Lexington Avenue, NEW YORK, N. Y.

600 SOUTH MICHIGAN AVENUE, CHICAGO, ILL. • 2315 TANGLEY ROAD, HOUSTON, TEXAS

70 BARN HILL, WEMBLEY PARK, MIDDLESEX, ENGLAND • FLORIDA 671, BUENOS AIRES, ARGENTINA

LUMMUS

PETROLEUM REFINING PLANTS

Homco Fullgage

DEPENDABLE DIRECTIONAL DRILLING

Homco Fullgage Deflecting Tools present an unparalleled achievement in the field of directional drilling. Their simplified design and operating principle, obviating costly round trips and tedious surface orientation, has been proven on hundreds of directional drilling operations ranging from simple sidetracking jobs to extremely difficult multi-well deflections. From a single marine location in the Gulf of Mexico, Homco Fullgage Deflecting Tools successfully drilled 19 deflected holes, thus exploring an area one mile square on a 20-acre spacing basis.

Homco Fullgage Deflecting Tools are as safe and reliable to operate as conventional drilling bits. Circulation may be maintained through the tools whenever desired. They drill out-to-gauge hole, thus saving rig time normally required by rat-hole type deflection. Add to this the fact that all Homco Fullgage engineers have had many years of specialized experience in directional drilling and you have the reason why more and more operators are standardizing on this dependable, economical service.

CONSULT THE HOMCO STAFF OF EXPERIENCED DIRECTIONAL DRILLING SERVICE ENGINEERS

HOMCO FULLGAGE DEFLECTOR

Drills a full-gauge deflected hole thru tough shales and harder formations. It may be used to cut thru faults or into steeply dipping beds found around many salt domes. Unequaled for side-tracking off cement plugs. Makes higher angles possible. It saves one round trip of the drill string.

FIG. 1

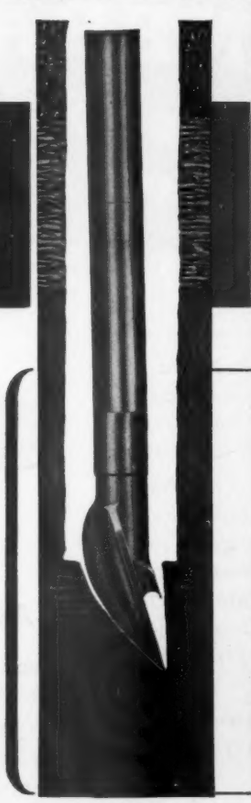


FIG. 2

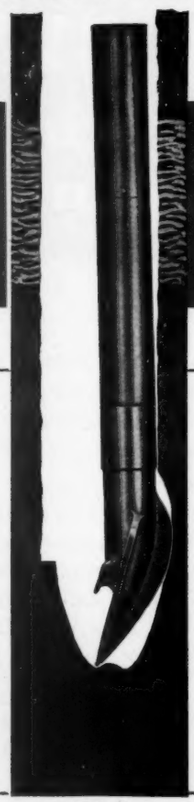


FIG. 3

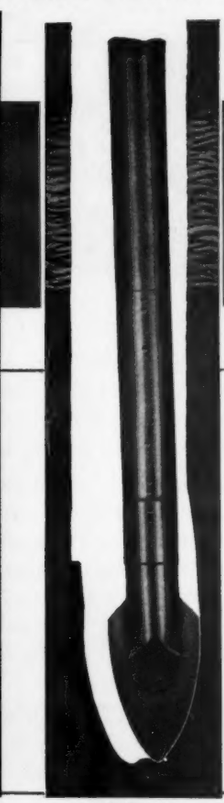


FIG. 4

HOMCO FULLGAGE DEFLECTING BIT

The only deflecting tool that can be re-oriented and re-set while at bottom of the hole, thus saving costly round trips of the drill string. It drills full-gauge hole . . . no reaming required. Figures 2, 3, and 4 illustrate its eccentric principle: (1) Bit on bottom and faced in direction of desired deflection; (2) Condition of hole after making one and one-half revolutions; (3) Position of bit after making several feet of deflected hole.

FIG. 5

HOMCO FULLGAGE ORIENTING SUB

Bottom hole orientation takes the guess-work out of orienting drill pipe. Fastest, most accurate method known. Provides absolute proof that the deflecting tool is pointed in the proper direction at the bottom of the hole. Eliminates the necessity of keeping track of the turns of the drill string while going in hole. No sight clamps or derrick man required.

HOMCO

CUTTING AND FISHING TOOL SERVICE

"Honest Service"

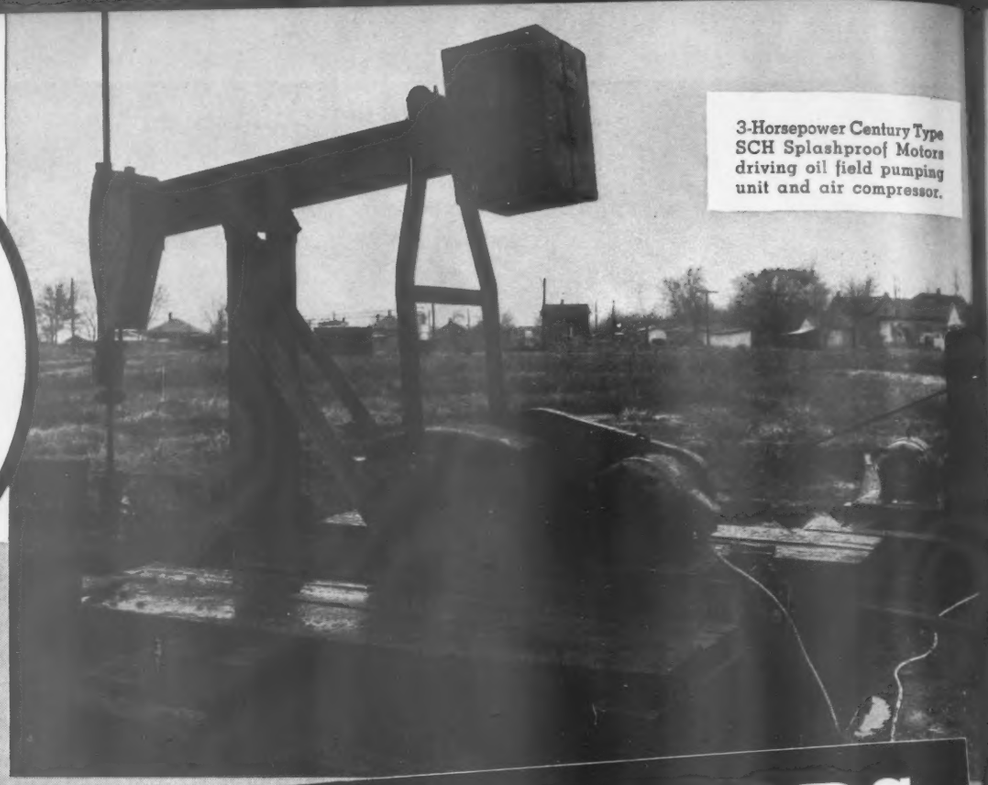
MOST COMPLETE CUTTING AND FISHING TOOL SERVICE IN THE WORLD

A Division of

HOUSTON OIL FIELD MATERIAL CO., INC.

HOUSTON, TEXAS, U. S. A.

CALIFORNIA SERVICE, HOMCO DIRECTIONAL DRILLING AND SIDEWALL CORING — BAKERSFIELD AND LONG BEACH



3-Horsepower Century Type SCH Splashproof Motors driving oil field pumping unit and air compressor.

Century

MOTORS and GENERATORS

Keep Production Steady— Keep Field Pumping Costs Low!

The ability of Century Type SCT Splashproof Pumping Unit Motors to stand up under the toughest field pumping conditions has won them world wide recognition and universal acceptance. Operators know that these Century Motors save wear and tear on equipment, keep pumping unit operating costs at a minimum.

Primarily this motor accomplishes such savings in two ways — it has a specially engineered high starting torque with which to start a tough load; it has a high slip which means that the motor speed pulls down when the load comes on. Because the motor slows down against maximum power peaks, using energy stored up in its own armature and the pump jack counterweight, it cushions the impact on your equipment. The result is a reduction in jolts and jars, longer life to gears, bearings, chains and other vital parts, and lowered maintenance expense.

Other advantages of Century Type SCT Motors for oil field use include greater starting efficiency, greater starting torque with less starting current, smoother power demand and less variation in line voltage.

Splashproof construction assures continuous operation through protection against rain, snow and ice.

Century Motors are available in various types and sizes from fractional to 600 horsepower — providing the correct electric motor for every oil field and industrial requirement. For complete information on all the advantages of Century Motors, see your regular supply store or call in the nearest Century Motor Specialist — today.

CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Missouri
Offices and Stock Points in Principal Cities

Century MOTORS

Century Type ACGR Generators

Where public service current is not available, an engine generator set with a Century Type ACGR Close Regulator Generator will do much to keep production continuous and pumping costs at a minimum. It maintains the voltage for squirrel cage motors within permissible limits without any accessory devices. Rheostats, meters, regulators or control panels are unnecessary.

Ask your supply store or your nearest Century Motor Specialist for the facts about this dependable, economical source of oil field power.

One of the Largest Exclusive Motor Manufacturers in the World

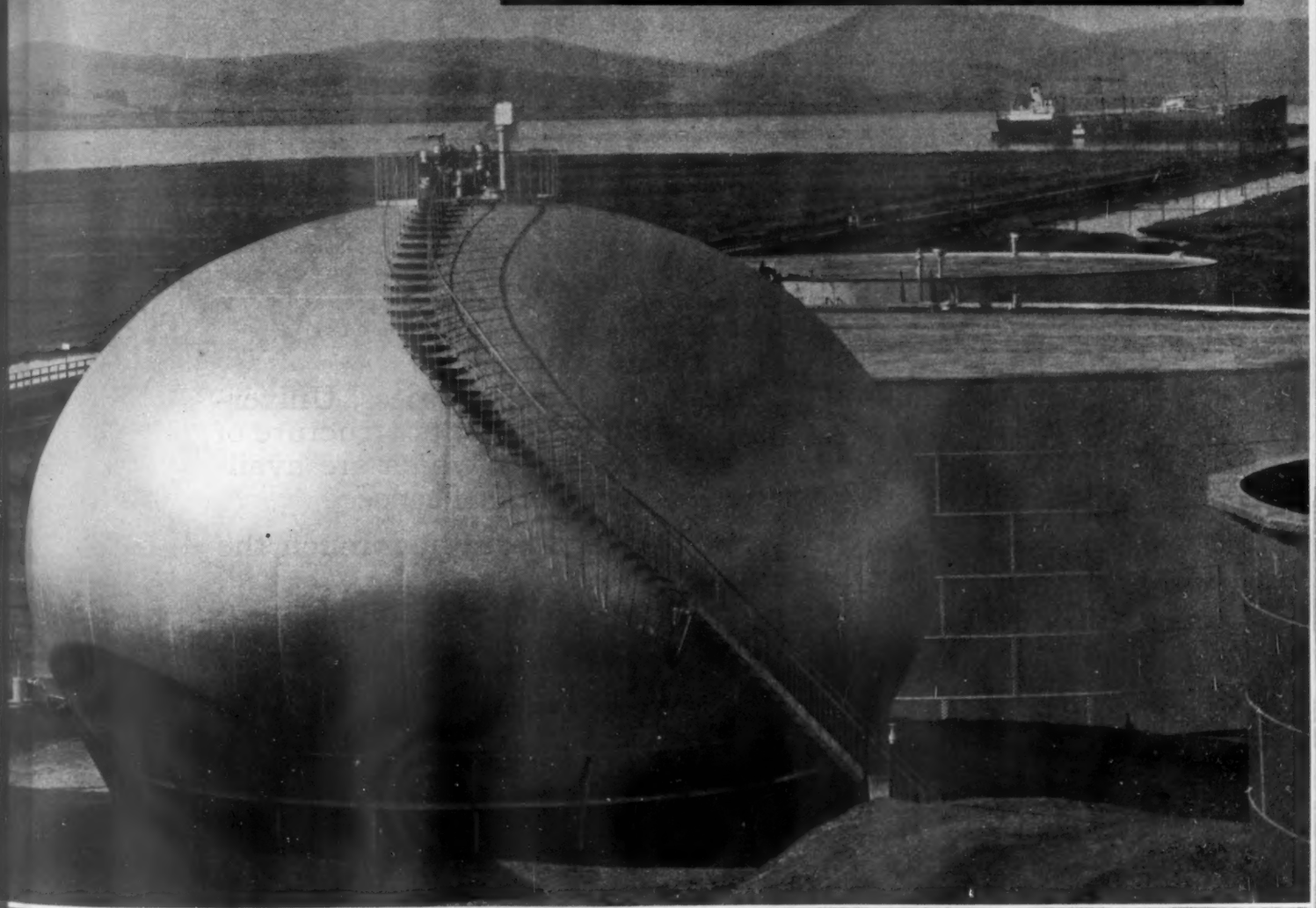
HORTONSPHEROIDS

..the Modern Way to Handle Pressure Storage Requirements

OIL men attending the 1941 A.P.I. Convention will see Hortonspheroid installations similar to the one illustrated here on the Pacific Coast, as California oil companies are capitalizing on the advantages offered through the use of spheroids for efficient pressure storage of natural gasoline and other volatile products.

Hortonspheroids prevent evaporation losses by making use of the simple fact that no loss will occur if vapor does not escape from the vessel. Thus, spheroids are designed to withstand an internal pressure, based on the vapor pressure of the product being stored. Instead of allowing the air-vapor mixture to expand or escape when the temperature rises, pressure is built up inside the tank. This principle has proved to be highly effective in eliminating breathing and boiling losses, and reducing or eliminating filling losses by the recondensing of vapor during filling.

The spheroid shown below has a capacity of 15,000-bbls., and is used to store blending stocks at a West Coast refinery.



CHICAGO BRIDGE & IRON COMPANY

HOUSTON	5619 Clinton Drive	CHICAGO	2128 McCormick Building	PHILADELPHIA	1615-1700 Walnut St. Building
TULSA	1606 Hunt Building	DETROIT	1514 Lafayette Building	BOSTON	1517 Consolidated Gas Building
BIRMINGHAM	1536 N. Fiftieth Street	CLEVELAND	2204 Builder's Exchange Bldg.	SAN FRANCISCO	1054 Rialto Building
HAVANA	402 Edificio Abreu	NEW YORK	3347-165 Broadway Building	LOS ANGELES	1423 Wm. Fox Building

Fabricating Plants in BIRMINGHAM, CHICAGO and GREENVILLE, PA.

Here is a new, better and less costly way to treat gasoline

It is the Unisol process which has been perfected by Atlantic Refining Company and is now for the first time offered to all refiners under license from Universal

Inexpensive reagents are used

Outstanding advantages are:

1. It removes by extraction practically all mercaptans, thereby reducing total sulfur content of the gasoline
2. It does not depreciate the octane rating of the treated gasoline
3. It improves the lead susceptibility of cracked and straight-run gasolines, increasing overall octane rating at less lead expense
4. Installation and operating costs are low because the process operates at low pressure, small volumes of reagent are used and losses are negligible

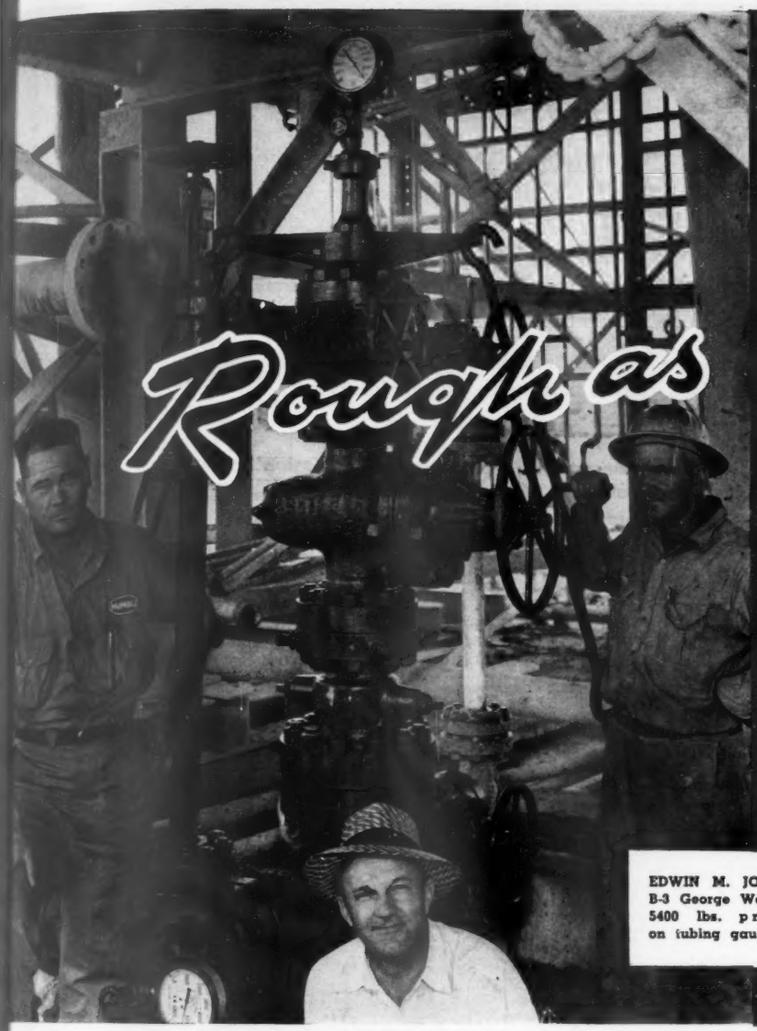
In obtaining rights to the Unisol process, Universal makes an important addition to its structure of refining technology and processes which are available to all refiners under U. O. P. license

It is worth your while to find out how much the Unisol process will save you

Why not find out—NOW?

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor



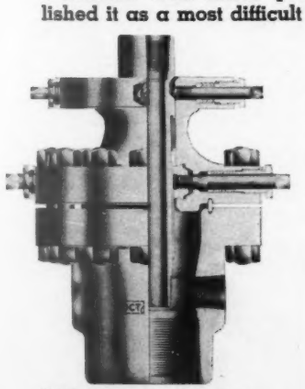
Rough as a Cob

TO DRILL AND COMPLETE BUT "JUST ANOTHER WELL" TO O-C-T COMPLETION CONTROL EQUIPMENT!

EDWIN M. JONES' No. B-3 George West. Note 5400 lbs. pressure on tubing gauge.

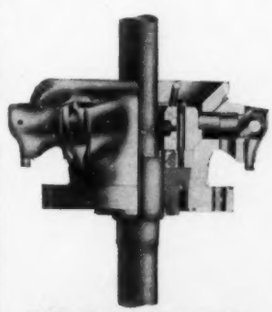
NO. B-3 GEORGE WEST, deep Wilcox test in the George West (Texas) field, was completed in August as a gas-distillate well and subsequently abandoned. Nevertheless, the extremely high pressures encountered, and the numerous tests made prior to its abandonment established it as a most difficult problem well.

THE O-C-T 10,000-LB. TEST CHRISTMAS TREE pictured above, together with an O-C-T Stripper Type Blowout Preventer (illustrated at right) enabled the operator to perform the prolonged completion operations "without a hitch."



O-C-T Type T-20-F1 Run-Through Type Tubing Head.

THE O-C-T TYPE T-20-F RUN-THROUGH TYPE TUBING HEAD (illustrated at left) permitted running gun perforators, tubing, and tubing hanger through the tree and washing the well into production. The tubing hanger, made up in the tubing string at a pre-determined point, was then raised to the suspension point and seated on the retractable hanger seats and locked in position. The O-C-T Stripper Type Blowout Preventer, installed above a ram type preventer, enabled the operator to make numerous round trips with the tubing in complete safety.



O-C-T Type J Blowout Preventer with stripper pack off.

Congratulations A. P. I.

Oil Center Tool Company extends congratulations to the American Petroleum Institute, whose untiring work toward mechanical equipment standardization has been a great benefit to the entire industry.

QUALITY O-C-T PRODUCTS

"Selling Through Leading Supply Stores"

OIL CENTER TOOL COMPANY

HOUSTON, TEXAS, U·S·A

Export Representative: Val R. Wittich, 30 Rockefeller Plaza, New York, N. Y. ● Oficina de representaciones extranjeras: Calle Lavalle 710, Buenos Aires, Argentina.

A TRIBUTE TO THE A-P-I

Your programs of standardization and engineering advancement have brought immeasurable increases in efficiency and money savings to the oil industry.

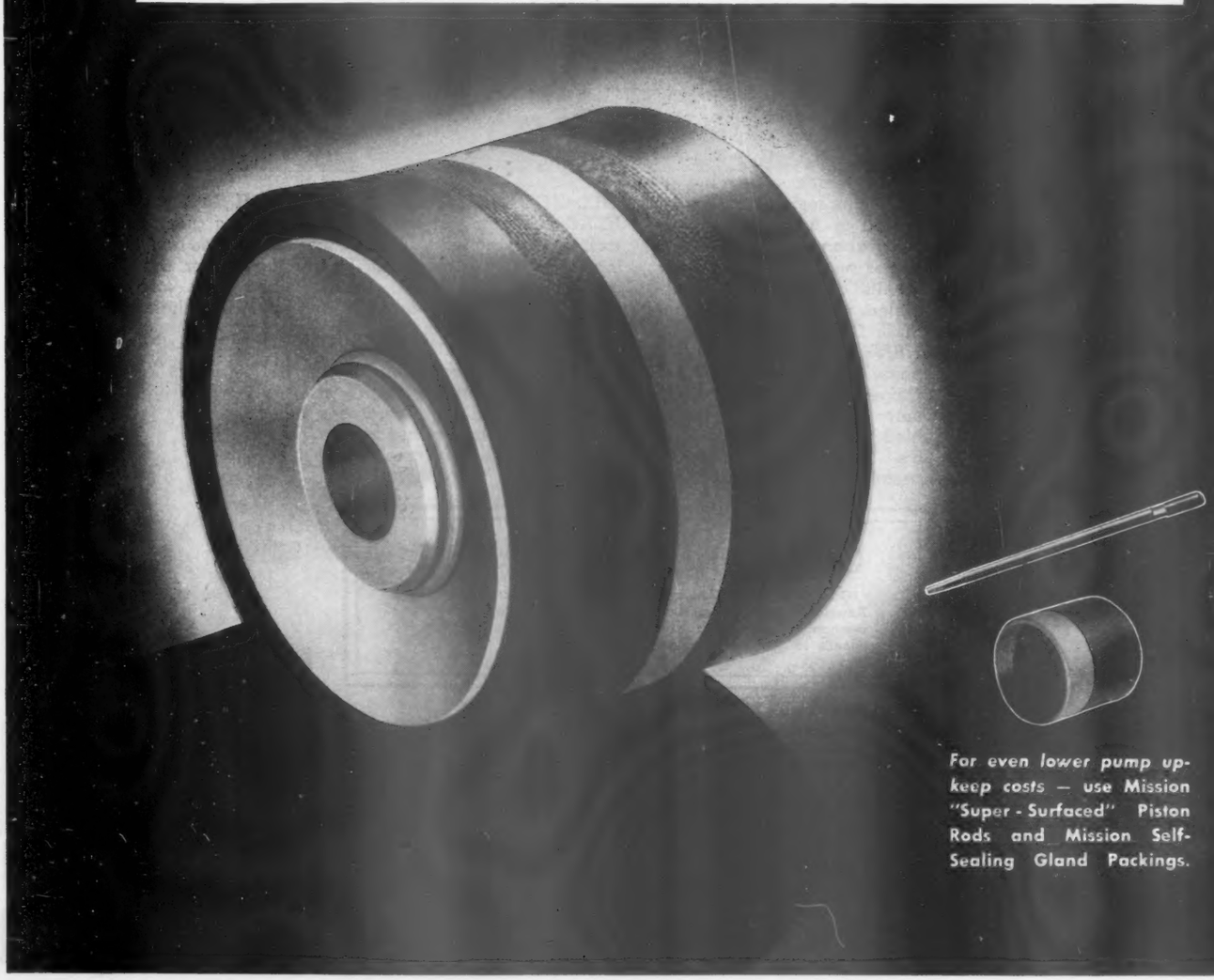
The importance of these benefits to the nation at this time makes us realize our indebtedness to those men of foresight who founded the A.P.I. and to those who are steadfastly carrying on programs of outstanding merit.

By increasing your orders, year in and year out, you have let us of Mission know that our continuous efforts to advance the design of each Mission product and to maintain high standards of precision are in line with your ideals of engineering progressiveness.

MISSION PRODUCTS

Mission Slush Pump Valves ● Mission "Super-Surfaced" and File Hard Piston Rods ● Mission "Self-Sealing" Gland Packings ● Mission "Rolling Dog" Slips ● Mission "Valveless" Swabs ● Mission "Automatic Lubrication" Plug Valves

MISSION
MANUFACTURING CO.
HUMBLE ROAD, HOUSTON, TEXAS
EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK



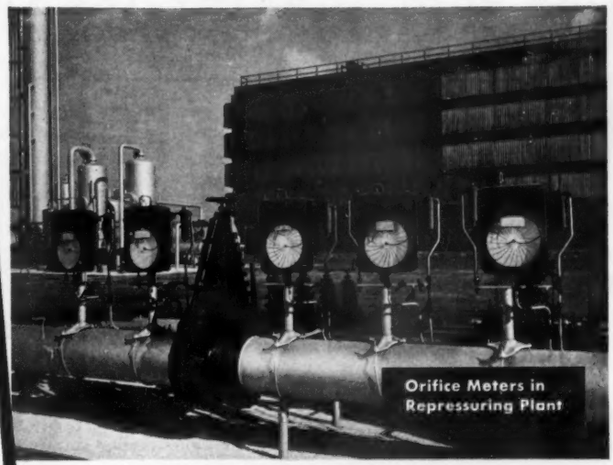
For even lower pump upkeep costs — use Mission "Super-Surfaced" Piston Rods and Mission Self-Sealing Gland Packings.

Bringing up the RESERVES!

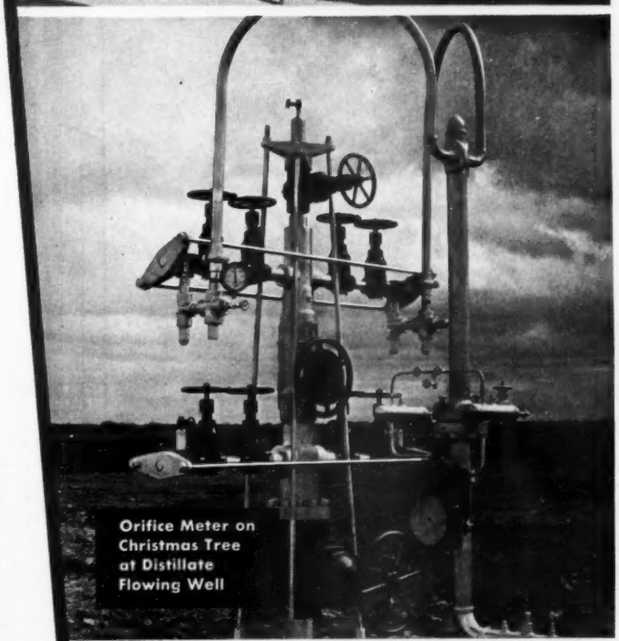
Modern repressuring, recycling and allied operations that mean profitable salvage and increased yields.

● Exacting work . . . for men and instruments! Experts are needed on each job . . . whether in testing the gas-input requirements of a deep producer . . . or working high-pressure gas-condensate reserve wells for the recovery of distillate and of gas for repressuring . . . or insuring optimum yields from the separator equipment in recycling plant operations.

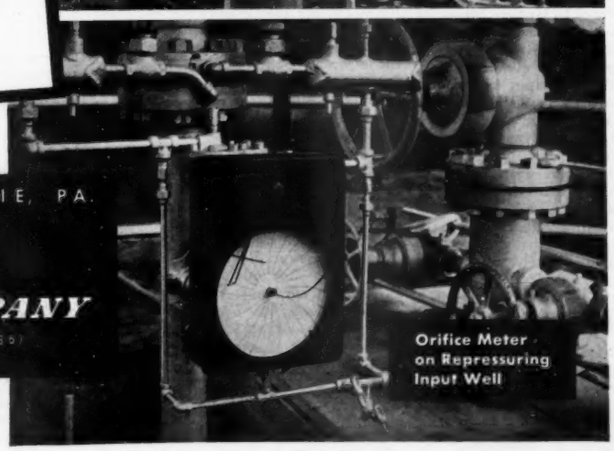
● Plant and field engineers trust METRIC-AMERICAN Orifice Meters and Flowmeters to do their part . . . efficiently, accurately . . . without need of constant surveillance and troublesome maintenance. Takes many a load off busy minds . . . and adds to their assurance of desired profits!



Orifice Meters in Repressuring Plant



Orifice Meter on Christmas Tree at Distillate Flowing Well



Orifice Meter on Repressuring Input Well

METRIC METAL WORKS • ERIE, PA.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

1409

BAASH ROSS News

OIL and G JOURN EDITI

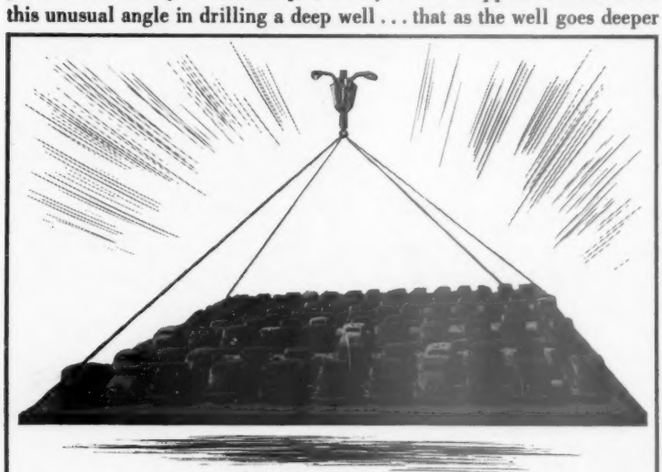
BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • NEW YORK

A BULLETIN COVERING NEWS OF EQUIPMENT AND OPERATIONS IN THE PETROLEUM INDUSTRY

NEW MARK FOR SLIP PERFORMANCE ESTABLISHED ON RECORD WELL

An Amazing Demonstration of "CU" Slip Efficiency

Often there's a lot more to a record-making performance than first meets the eye. For example, have you ever stopped to think about this unusual angle in drilling a deep well . . . that as the well goes deeper and deeper, you can generally offset the extra pipe load by using larger and heavier equipment—more lines, larger blocks and a bigger hook.

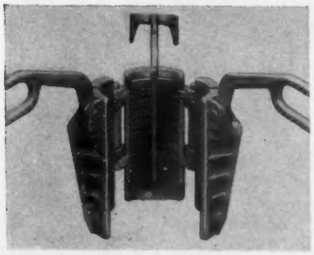


A drill string load equal to the weight of a HUNDRED automobiles was reached in drilling Honolulu's 14,622-ft. well. Yet BAASH-ROSS TYPE "CU" ROTARY SLIPS supported this tremendous load so efficiently that *regular length* slips were used all the way to bottom . . . a record unequalled in the history of the industry!

But when it comes to Rotary Slips, you're up against a different proposition. There's just so much gripping surface around the circumference of a piece of drill pipe. And, as you go deeper and use smaller and smaller pipe, the available gripping surface becomes *smaller* instead of larger, making it doubly imperative that you use slips that grip *every last square inch* of available pipe surface *effectively!*

So, with that in mind, check *this* . . .

When Honolulu Oil Company drilled its record-breaking 14,622 ft. well recently . . . the deepest electrically drilled well in the world and the second deepest well *ever* drilled . . . they used BAASH-ROSS "TYPE CU" ROTARY SLIPS to support the drill string going in and coming out of the hole. And so efficiently did these slips perform—so uniformly and smoothly did they grip the pipe under the most severe operating conditions, that the same set of *regular length* slips was used right down to bottom—14,622 ft.—*without ever having to change to the longer length model!*



There IS a record . . . particularly when you know that the maximum drill string load on this well ran around 290,000 pounds—more than *the combined weight of a HUNDRED automobiles.* That's a sizeable load to support with ANY set of slips. But to support it day after day in slips only 12" long is *really* a test of slip efficiency. *Never before have regular length slips been used successfully to such a depth!*

That gives you some idea of the unusual performance built into these Baash-Ross "CU" Slips. And here are the features that make such efficiency possible...

▸ **First, they're UNITIZED:** Each segment moves in perfect *vertical* alignment with the others so there's no danger of damaging the pipe by setting one slip too high or too low in the bushing. And the separate segments are so hinged together that they maintain perfect *vertical* alignment—yet are free to adjust themselves *laterally*—as they feed in around the pipe. This means absolutely uniform distribution of slip pressure at ALL points . . . and no "crimping" of the pipe at any time.

The B-R Hinge Pin permits lateral adjustment yet keeps slips aligned.

▸ **They're LIGHT WEIGHT:** You can imagine what a long drag a round trip is from 14,000 feet. That's where the *lightweight* feature of these slips saved crew energy. For every last ounce of unnecessary weight has been skillfully eliminated from "CU" slips so they are light, yet amply strong to handle the longest strings, as this record conclusively proves. And "CU" Slips are balanced to handle perfectly . . . fast, smooth, *effortlessly!*

▸ **They have INTEGRAL LINERS:** Only liners solidly mounted in the slip body could stand up under the tremendous load of a 12,000 or 14,000 ft. string.

In "CU" Slips the liners are mounted so that they are practically an integral part of the body itself. *There are no bolts or pins to shear under load,* for all strains are transmitted directly to the body through large support shoulders. What's more, the liners are unusually easy and quick to change simply by removing a *single* liner retaining key.

▸ **They have SAFETY HANDLES:** Notice the *full loop* handles that protect the crew's hands from being caught against the rotary table—a feature that speeds work, boosts safety on wells of *any* depth.

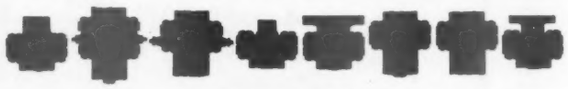
Get the FULL STORY: There are many more advanced features built into the "CU" Slips—features that step crew efficiency way up and safeguard your drill pipe on even the deepest jobs. Ask your Baash-Ross representative to show you these slips *now* for your current drilling work.

Details on the Baash-Ross "Type CU" Slips are given in Bulletin No. 2D, sent free on request. Write today.

A Friendly tip to Production Men

The next time you come up against a completion job that's tough to crack, remember this . . . Baash-Ross makes FOUR different Tubing Head bodies...

any one of which can be combined with EIGHT different Tubing Head suspensions



to give a choice of THIRTY-TWO *custom-made* Tubing Head assemblies, one of which will exactly fit YOUR particular requirements!

With this simplified line of Tubing Head Assemblies you need stock only a few standardized parts to meet *every* completion problem on the lease. You save money by eliminating costly specialized units. You save *time* by being able to meet all your requirements from stock. And you get a BETTER job on every well.

Why not look into this time-saving, cost-cutting system of meeting your Tubing Head requirements today? We'll gladly send you detailed information on the different Body and Head designs and how they may be interchanged to meet every field condition. Or get in touch with your nearest Baash-Ross representative!

ON THE LOOKOUT

THE VITAL IMPORTANCE of proper pH control (control of acidity or alkalinity) in oil refinery operations, in drilling mud conditioning, etc., is being recognized by more and more operators in the petroleum industry. A new booklet just published tells important basic facts to know about pH—what it is, how it's used, how it fits into modern industrial operations. Reduces to simple, easy-to-understand language the basic facts about modern pH control. (No. B-111)

BAASH-ROSS

TREND TO HEXAGONAL KELLYS is becoming increasingly pronounced in the oil industry. Recent sales figures indicate a 140% jump in demands for Hex Kellys this year with the swing becoming even greater as more and more operators give Hex Kellys a fact-finding tryout. (No. B-112)

BAASH-ROSS

A "PLUS-MINUS" SLIDE RULE is an interesting new development which should be a valuable aid to any engineer or oil man who works with fractions. Unlike conventional slide rules which multiply and divide, this rule *adds and subtracts* common fractions such as 1/64, 3/32, etc., as well as their equivalents in decimals. Fractional inches can be added directly to decimals and results read in either fractions or decimals. Can be used for both inches and metric measurement. (No. B-113)

BAASH-ROSS

AN INSTRUMENT that automatically—and continuously—records both weight and viscosity of drilling mud will soon be made available to the oil industry, according to a recent report. The unit—several years in development—is rugged, highly accurate, and provides a continuous log of mud *weight* in pounds per cubic foot and *viscosity* in centipoises. Should prove indispensable in maintaining the mud control necessary for modern drilling operations. (No. B-114)

BAASH-ROSS

Further information on above items may be obtained by sending your name, address and number of keyed item on a postcard or letterhead.

HAROLD L. ICKES | TOM CONNALLY | WILLIAM R. BOYD, JR. | RALPH K. DAVIES | ALFRED P. HAAKE | T. G. GALBRAITH

CALIFORNIA EXTENDS WELCOME TO A.P.I.

ALL California and the West Coast join in welcoming the membership and guests of the American Petroleum Institute which will hold its twenty-second annual meeting in San Francisco, November 3-7, inclusive. It is the first meeting of the Institute in the city of St. Francis by the historical Golden Gate and the third time the meeting of the petroleum industry's largest trade organization has been held in California.

The Institute was founded largely as a result of the accomplishments of the petroleum industry during the first World War. Representative leaders of the industry brought about the organization of the Institute in order to continue during peacetime the cooperative work of the war period.

This year conditions brought about by another World War are dominant in petroleum operations and this fact is reflected in the program that has been arranged for the 5-day meeting. A message direct from those who are conducting the nation's defense program will be brought to the meeting by Harold L. Ickes, secretary of interior and petroleum coordinator for national defense. Other members of the coordinator's staff will participate in the program.

The petroleum industry of California, the second largest of the petroleum states, has completed all arrangements for the entertainment of those who will attend the San Francisco meeting from all parts of the United States and several foreign countries. Before and after the meeting, those coming from outside the state will be able to visit fields, refineries and natural-gasoline plants where many of the industry's latest developments in operations can be seen. In San Francisco special provisions have been made for sightseeing to numerous points of interest.

Conditions brought about by the defense program have emphasized the necessity of more petroleum research. Research on the properties of hydrocarbons at high pressures and temperatures make deep development more profitable. Research on corrosion results in immeasurable savings in the use of metal at a time when every pound of steel counts. Control of gas and water-oil ratios, multisand completions, cooperation between the engineer and his coworker, reduction in size of hole all point to greater efficiency and economy. For the refiner, research in pure compounds, on the synthesis of other compounds, on improvements in refinery technique help him to make crude of more value to more people and at less cost.

These contributions to fundamental knowledge of the production and utilization of petroleum form a highly important part of the meeting.

Following is a skeleton program of the meeting.

SPEAKERS AT GENERAL SESSIONS OF MEETING

HAROLD L. ICKES . . .

Secretary of the Interior, Petroleum Coordinator for National Defense and administrator of the oil code during NRA.

TOM CONNALLY . . .

Senior senator from Texas, chairman of the Senate foreign relations committee and author of the Connally hot-oil act.

W. R. BOYD, JR. . . .

Executive head of the American Petroleum Institute. He has been in high office of the Institute since 1920.

RALPH K. DAVIES . . .

Deputy petroleum coordinator for national defense and former vice president of Standard Oil Co. of California.

ALFRED P. HAAKE . . .

Managing director of the National Association of Furniture Manufacturers. Writer and lecturer on industrial economics.

COMDR. T. G. GALBRAITH . . .

Member of the British Supply Council and a member of the British Parliament. Served the Royal Navy 1903-22. Returned to active duty at start of war.

Monday, November 3

Committee meetings all day.

Tuesday, November 4

Committee meetings all day.

2 p.m. Group Session.—Fire Protection.

2:30 p.m. Board of directors.

8 p.m. Group Session.—Automotive Transportation.

Wednesday, November 5

9:30 a.m. Group Session.—Division of Production.

10 a.m. Board of councillors.

Meeting of board of councillors: To nominate candidates for election as members of the board of directors.

2 p.m. General Session.

Report of board of councillors and election of directors.

Address: W. R. Boyd, Jr.

Address: Hon. Tom Connally, U. S. senator from Texas; chairman of the Senate foreign-relations committee.

Address: Hon. Harold L. Ickes, secretary of the interior; petroleum coordinator for national defense.

Thursday, November 6

9:30 a.m. Group Session.—Division of Production.

9:30 a.m. Group Session.—Division of Refining.

9:30 a.m. Group Session.—Division of Marketing.

Marketing Session.

10 a.m. Board of directors. The executive committee will meet immediately following the last session of the board of directors.

2 p.m. General Session.

Address: Ralph K. Davies, deputy petroleum coordinator for national defense.

Address: Alfred P. Haake, National Association of Furniture Manufacturers, Chicago.

Address: Comdr. T. G. Galbraith, Royal Navy, British Supply Council, Washington, D. C.; member of parliament.

7:30 p.m. Annual dinner. A program of entertainment is being arranged.

Friday, November 7

9:30 a.m. Group Session.—Division of Production.

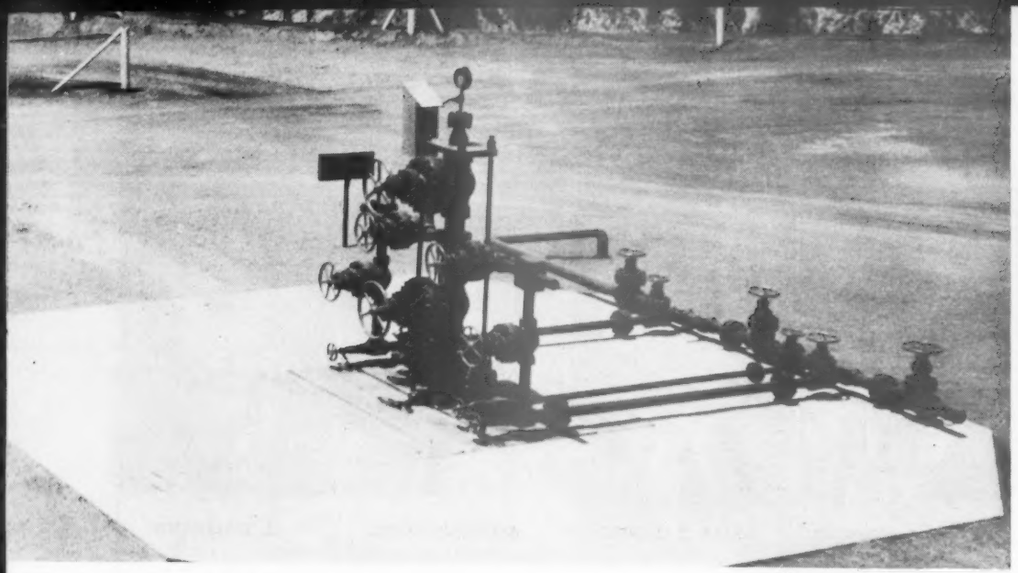
Report of division's nominating committee, F. S. Bryant, Standard Oil Co. of California, San Francisco, Calif., chairman.

Election of 20 members of the general committee of the division of production.

9:30 a.m. Group Session.—Division of Refining.

Election of 20 members of the general committee of the division of refining.

2 p.m. Group Session.—Division of Production.



(Courtesy *Doings in General*)

Typical well hookup in Santa Barbara County, California, showing modern practice of landscaping properties

Early records of California's history as an oil-producing state are meager, but enough of them survive to suggest the romance with which it is interwoven. The first well in the state was drilled in 1866. In the 75 years since that date the state has become second only to Texas in the volume of oil its wells produce. In refining capacity California also ranks second among the states, and has its own pipe lines and tanker routes.

California Reaches Diamond In History As An Oil Produc

THE discovery and development of oil production in California subsequent to completion of the Drake well in Pennsylvania is so interwoven with romance and reality that it reads like fiction. The West at that time was still wild and woolly, Los Angeles was a pueblo and San Francisco had just outgrown Yerba Buena, as it was originally known. California was first mentioned in 1510 by Garcia Ordonez de Montalvo of Spain and Cortez applied the name to a Spanish colony at La Paz in Lower California in 1537. Original Spanish claim to California resulted from the voyages of Cabrillo and Ferrer. It is generally believed that the state is named after the imaginary kingdom of the Amazons of Spanish romance. Sir Francis Drake for the English visited the Pacific Coast in 1579 but no permanent settlements were made until the Franciscan missions were established beginning in 1769. These early missions were established usually 1 day's journey apart and extended along El Camino Real, the King's Highway, from San Diego in the south to San Francisco in the north. California was brought into possession of the United States in 1846-47 through conquest by military and naval forces in the Mexican War and was ceded to the United States by the Treaty of Guadalupe Hidalgo, February 2, 1848. Gold was discovered in 1848 by James C. Marshall at Sutter's mill near the spot where Coloma now stands and this led to the Gold Rush in 1849. California was admitted to statehood September 9, 1850.

First oil well drilled in California in 1866. Derricks in the background are over wells drilled later in the Santa Paula district

"Black Gold" Has Greatest Value

Although gold mining has become a major industry in California since the discovery of gold in the mill run back in 1848, the value and importance of the black gold from the state's numerous fields greatly exceeds that of the former. Early records of the California petroleum industry are rather few and far between as might be expected due to the large areal extent of the state and the numerous unsuccessful attempts to develop production extending over a period of years. Nine years before the drilling of the Drake well in Pennsylvania, oil seepages were found in the Ventura-Newhall region and in subsequent years other similar seepages were found elsewhere. It was a long time, however, before the commercial significance of oil in California became apparent as early work consisted of the drilling of shallow wells in areas that were at that time beyond reach of the hand-drilled well.

W. A. Brophy, who at one time operated a number of wells in the Los Angeles city field, was asked a number of years ago to jot down his remembrances and recollections of early California conditions. Following is his reply: "The question as to where the first commercial well was discovered and operated in California has been asked many times and some of the answers have been decidedly erroneous, as the following facts in regard to the matter will show. During the middle sixties there was an oil excitement in California and a number of shallow wells were started, mostly in the northern counties and also some in what is now Ventura County but was at that time a part of Santa Barbara County, and a few in Los Angeles County, mostly in the San Fernando petroleum mining district but now known as the Newhall oil district. A few tunnels were also driven into the side of hills and so built that any oil present would run out the mouth where it would be trapped. A small amount of oil was found in some of these wells and tunnels in southern California but practically none of any commercial value in northern California, which included the counties of Humboldt, Colusa, Contra Costa, San Mateo and others. In 1867 there were a few small wells in Santa Paula, Adams, Saltmarsh, Stanford and Aliso canyons and a few in Ojai Valley. There was also one in Tapo Canyon, then in Santa Barbara but now Ventura County. There was also a small refinery in Santa Paula Canyon that was operated in a small way by a man named Scott and his son Sandy. The oil was obtained from these small wells and tunnels and was handled by ranch teams in barrels. The only product was kerosene and it was of a poor quality and smoked considerably when used in lamps and heaters. The retail price was 50 cents per gallon and the demand and sale local only.

"At that time the present town of Santa Paula was nonexistent and the Rancho Santa Paula y Saticoy, a Spanish grant, covered the entire area

Birthday ing State

By L. P. STOCKMAN

of the Santa Clara Valley in that vicinity. In what is now the Newhall oil field, but which was at that time known as the San Fernando petroleum mining district, there was one well in Towsley Canyon which produced a few barrels per day, also one tunnel that produced about 1 bbl. daily and one well and one tunnel in Wiley Canyon that produced a small amount of oil. By 1870 practically all of these small wells and tunnels were almost forgotten and to all intents and purposes abandoned. The Newhall field soon after this began to attract some attention and in 1873 a wildcat well was started in Grapevine Canyon about 5 miles above San Fernando and 2 miles east of the present Newhall railroad tunnel. This well was started by a few Los Angeles business men and was drilled to a depth of 417 ft. A heavy gas pressure was encountered at this depth but no oil was found. In the following year, 1874, a wildcat well was started by a small company of Los Angeles business men in what is now known as Temple Canyon which is a branch of Towsley Canyon. Frank Temple, a Los Angeles banker, was the principal backer of this venture and the well was drilled to a depth of 530 ft. and a small amount of oil was obtained. This well was not productive commercially, however, and was later abandoned. About this time, Rudolph Carrerras, a Cuban who claimed to be a chemist and refiner, appeared on the scene and persuaded local people to build a refinery for him at San Fernando. It was built but never operated on a commercial scale and was finally abandoned due to lack of an adequate supply of crude oil. A wildcat well later was drilled near what is Westlake Park in the center of Los Angeles and a very small amount of oil was found but it was of no commercial value.

"Now comes the time when the first commercial well was completed in California and it was at Pico Canyon 7 miles west of the present town of Newhall, although the town was at that time nonexistent. In the month of August 1875 an oil-well driller from Pennsylvania named C. A. Mentre, or as he was better known, Aleck Mentre, leased the Pico claim, which was a placer claim, from Beale and Baker of the Tejon ranch, Kern County, and commenced to drill a well with a spring-pole outfit and starting 5-in. hole. This well proved to be the first commercial well of high-grade oil found in California and led to an extensive development of that property by the drilling of numerous wells and eventually to the founding of the Pacific Coast Oil Co. I was on this ground the first time as early as 1870 and there was not the slightest indication that any wells had been drilled on it or that work of any kind had been done there previous to Mentre's

General Petroleum Corp.'s Vernon, Calif., refinery has grown from the property pictured at the top in 1913 into the modern plant and facilities shown below in 1941

Lake View gusher of Union Oil Co. in Maricopa field, California, the largest well completed in the state

work as it was a wild rugged canyon and almost inaccessible previous to that time.

"There is a statement which has practically gone down into history to the effect that oil was obtained from Pico Canyon in 1856 by Andreas Pico and crudely refined at the San Fernando Mission. This, I believe, is erroneous. I have met Andreas Pico in the olden days and never heard of anything of this kind and in those days he would have had to haul it over the San Fernando Mountains where there were no roads and where wagons were hoisted over the hills with long ropes and pulleys. In addition there was no road up Pico Canyon 7 miles further as it was difficult for a person to get up there on foot. Referring again to the work of Mentre with his spring-pole well. He encountered oil at 25 ft. and at 30 ft. could bail out 2 bbl. of 32-gravity oil. At 175 ft. the well pumped 30 bbl. per day. No casing was used or necessary. Several shallow wells were subsequently drilled and after small production, perhaps as much as 60 or 70 bbl. per day was established, the California Star Oil Co. was organized. This was the predecessor of the Pacific Coast Oil Co. and what subsequently became the Standard Oil Co. Machinery was later procured and No. 4, a famous well, was drilled. At a depth of about 600 ft. it produced 75 bbl. per day of 42-gravity oil.

Built Small Refinery

"About this time D. G. Scofield, Mayor Bryant of San Francisco, B. F. Taylor and others became interested in the company. A small refinery was built at what is now Newhall and for some time the oil was hauled in barrels to the refinery from the nearby producing wells. Later a 2-in. pipe was laid and the oil handled in that way. One of the wells in Pico Canyon, called No. 7, was a flowing well and the only one that did not have to be pumped. It flowed 40 bbl. per day for 10 years without change and was 850 ft. deep." This statement of Mr. Brophy checks with that of another pioneer, W. W. Orcutt, retired vice president of Union Oil Co. and generally recognized as having started the first geological department in California if not in the country. Mr. Orcutt, for whom the town of Orcutt in Santa Barbara County was named, was a classmater of former President Herbert Hoover and was ersponsible for important discoveries in the La Brea pits in Los Angeles as well as laying the foundation for geological and petroleum-engineering practices.

W. W. Orcutt, who has an exceptionally keen recollection of old days and who is a student of California history and the geology, flora and fauna of the West, wrote 10 years ago: "It was not given to Governor Felipe de Neve and his small band of followers, who gathered on the banks of the Los Angeles River 150 years ago to found the pueblo of Los Angeles, to know that they stood over a fountain spring of wealth that one day would pour forth its riches in a never-ending stream to build into one of the greatest cities in the Western Hemisphere. They had dreamed of gold; cities paved with precious metals, but never in their most fanciful moments had they conceived a treasure so vast as that which was stored under the bleak-looking desert and the sun-burned hills that surrounded them and in areas of the new land still to be explored.

Discover Seepage in 1850

"It was almost 100 years after the ceremony that marked the founding of the City of the Angels that the presence of this treasure, oil, was suspected in California. In 1850, 9 years before the drilling of the famous Drake discovery well at Titusville, the first oil seepages were found in the Ventura-Newhall area. In the 10 years that followed this discovery, other seepages were located, and in 1864 first definite plans were made to produce oil. At that time it was proposed to run tunnels into Sulphur Mountain, in Ventura County, to tape the source of the seepages. That same year Thomas Scott, then associated with the Pennsylvania Railroad, formed a syndicate which purchased prospective oil properties in Ventura County. Early in 1865 this syndicate secured in New York City the first drilling equipment ever sent to California. Mr. Scott later sent his two nephews, Thomas R. Bard and D. D. Scott, to California to look after his interests. Mr. Bard later became quite prominent in oil development in the state and also served a term as United States senator from California.

"In 1866 Leland Stanford completed the first tunnel in Sulphur Mountain, an 80-ft. drift that tapped the steep-dipping oil sands at the base of the mountain and produced a few barrels of oil a day. This was followed by numerous similar

New type service station, incorporating a window display in its design

developments. At about this time the first shallow wells were drilled in the Ojai district, Ventura County, and in Pico Canyon at the head of San Fernando Valley. A small amount of oil was obtained from these wells and, immediately, further activity was launched. In 1875 C. A. Mentre drilled a well in Pico Canyon that produced 5 or 6 bbl. a day and, at the same time, was the most consistent producer in the state. In the same year D. G. Scofield, later president of the Standard Oil Co., organized the California Star Oil Co. and acquired the Mentre lease. This company built California's first refinery at Lyon station, near Newhall. In 1876 the Santa Clara Oil Co. began operating at Moody Gulch near San Jose and 3 years later McPherson and Felton organized the Pacific Coast Oil Co., which absorbed the California Star Oil Co. and the Santa Clara Oil Co. and later merged with Standard Oil Co.

"News of the oil development in California, reaching the Pennsylvania oil fields about this time, induced two of the pioneer oil operators of that state, Lyman Stewart and W. L. Hardison, to bring drilling equipment and crews to California in 1883. Their first four holes, drilled in Pico Canyon, were dry. This was the beginning of operations that led to the founding of the Union Oil Co. in 1890. The production and refining of oil in California had, at that time, given evidence of the new industry's future permanency. Men engaged in it began preparing for the future and studying ways and means of establishing new markets for the oil being produced. Kerosene at the time was the chief product. Heavy oil as a fuel was just being tried out and its lubricating possibilities tested."

Drilled for Water—Got Oil

With respect to the Los Angeles city field, or as it was then locally known as the Second Street Park oil field, Mr. Brophy wrote: "This famous little field is located in the city of Los Angeles and not more than a mile from the city hall and close to the business district. Outcrops of brea and asphalt were known to exist in the small canyons and ravines for a number of years and the brea in solid form had been used for fuel in a small way but the first real indication that oil might be found here was in the year 1857 when a contractor who was sinking a well for water at what is now the corner of Spring and Franklin streets at a depth of 800 ft. encountered quite a showing of heavy black oil but no water. Not knowing what oil was at that time, this discovery being made about 2 years before the discovery made by the famous Drake well in Pennsylvania, the contractor abandoned the well and almost forgot about it. Many years afterwards when oil was known to be valuable he petitioned the Los Angeles City Council to allow him to open up the well, but his request was refused as the location was then a city street while when he drilled there it was only a cow path.

(c) Spence Air Photos

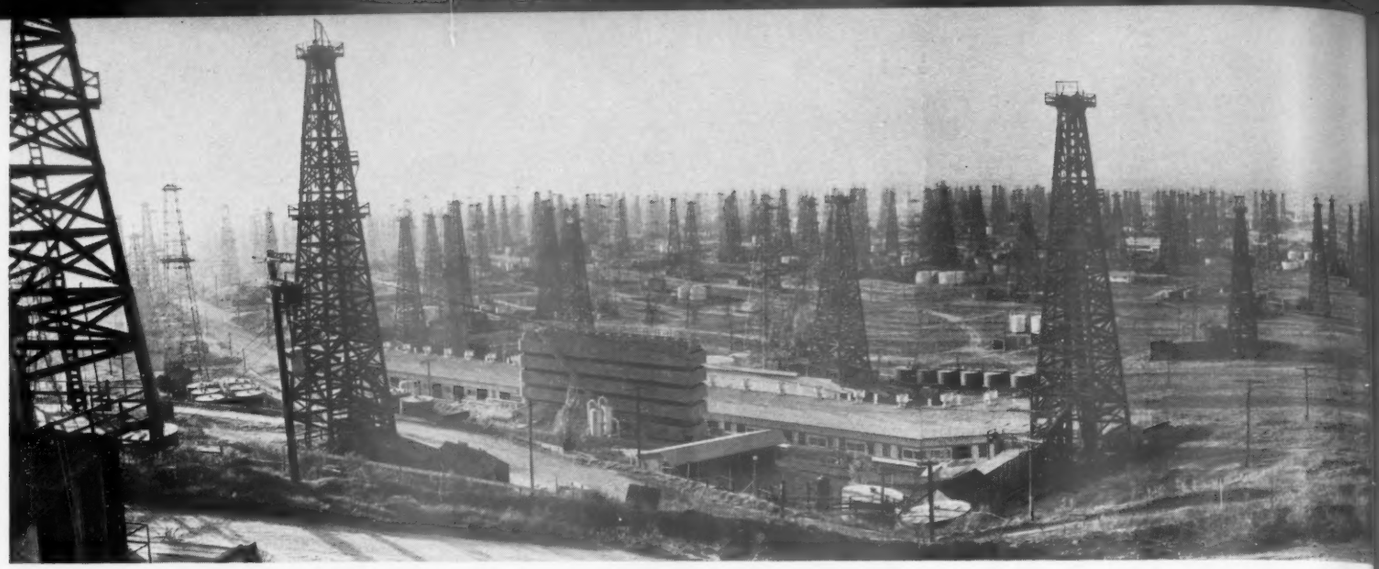
Kettleman North Dome oil field, California. Standard Oil Co. of California owns in fee every alternate section of 640 acres. Most of the remainder is operated by Kenda

Horse-drawn tank wagon of an earlier era in California distribution

Gas Found in Los Angeles

"A well was drilled for water in the rear of the Baker Block on North Main Street and at a depth of between 700 and 800 ft. encountered a strong flow of natural gas but no water of value and was abandoned. A well was drilled for water in the rear of the old United States Hotel on North Main Street near Commercial and at a depth of between 800 and 900 ft. encountered quite a flow of gas but not very much water. On the grounds of the Orphans Home, in the Mexican part of Los Angeles, a well was drilled for water and at a depth of less than 100 ft. found a flow of natural gas that when ignited would burn to a height of 10 ft. but soon decreased in volume. In the year 1865 a well was sunk on Temple Street to a depth of less than 400 ft. which developed a flow of gas that when lighted would burn all night. About halfway between Los Angeles and Hollywood, an old-time pioneer named Ivar A. Weid drilled a well over 800 ft. deep which had a small showing of oil and gas but was abandoned at that depth. Other wells were drilled near the city but none encountered oil in paying quantities until the Maltman wells were drilled northeast of the old Baptist College. Here about nine shallow wells were drilled by John S. Maltman. By pumping, these wells produced about 2 bbl. per day each and ranged in depth from less than 150 ft.

(Continued on Page 98)



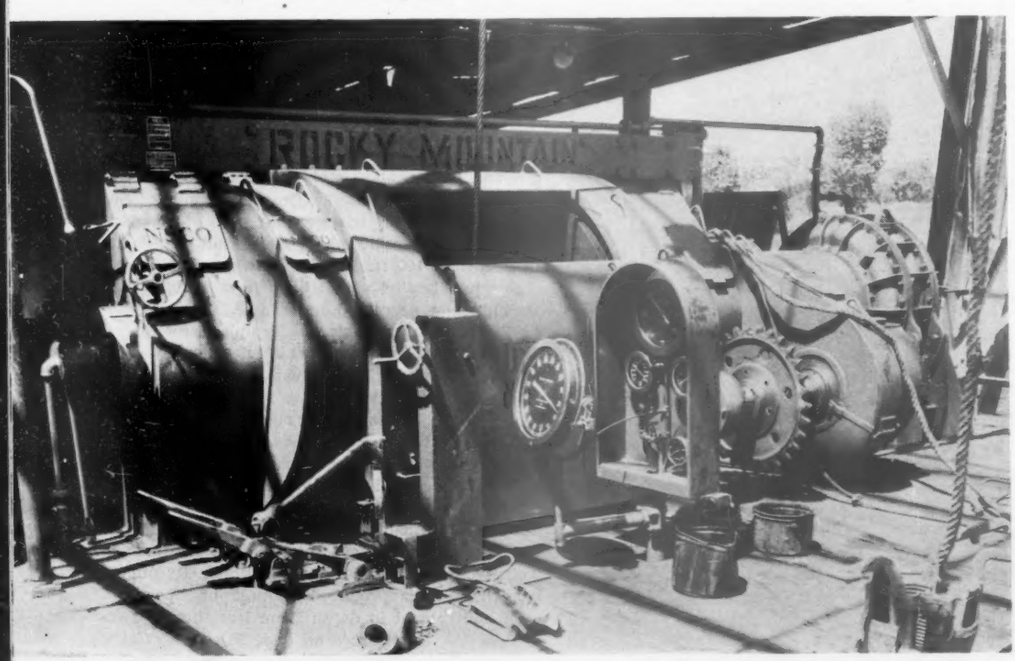
Improvements Continue in Production Practices in

By T. P. SANDERS

ALTHOUGH the California drilling industry, in 3½ years, has never surpassed the depth record established by Continental Oil Co. at Wasco in April 1938, several deep-drilling records of a different type have been made within the past year that may be of lasting economic importance. Unlike the drilling of the 15,004-ft. world's record holder, the newer drilling records have tended to reduce costs of drilling.

Honolulu Oil Co.'s 25-P in the Buena Vista Hills, which reached a depth of 14,622 ft. before being plugged back, showed that it is possible to carry more than 11,000 ft. of open hole under favorable stratigraphic conditions if the mud is properly handled and the hole is not allowed to deviate from vertical. Since the introduction of rotary drilling there has been a steady increase in the amount of hole that could be drilled below the surface string before an intermediate or water string was required. As it became possible to carry more open hole, the cost of wells decreased. Casing, one of a well's most expensive items, was thereby saved. Also, since both the drilling speed and the cost of making hole are, within certain limits, functions of the diameter of the hole being drilled, considerable sums were saved on bits, drilling time, and related items. The open-hole record established by Honolulu Oil Co. far exceeds any previous records, and thus it is a milestone in the constant effort toward reduction of drilling costs.

Last year, when Continental Oil Co. broke all speed records by drilling 13,157 ft. of hole and landing 12,878 ft. of 6⅝-in. casing in an elapsed time of 60 days, another contribution was made toward lowering of deep-well costs. Later, when Rocky Mountain Drilling Co. of Los Angeles drilled three 13,130-ft. Wasco wells for Standard Oil Co. of California in a total of 99 drilling days (not including installation of casing or other interruptions) it was proved that deep wells could be "chain drilled" with important savings.



Super-Deep Drilling at Hand

The stage is now set for the advent of super-deep drilling on an economically sound basis. The 15,004-ft. Wasco well never gave much hope of returning a profit because of the necessarily high drilling costs. This is one reason why its depth has never been bettered by subsequent California drilling. It did prove that holes could be drilled to that depth, and that production from such depths was possible. It has remained for other deep-drilling ventures to point the way toward lowering of drilling costs to such an extent that deeper drilling soon can be undertaken with a reasonable chance for profit. Within the past year, wells have been drilled for the first time in history to depths exceeding 11,000 ft. at costs of $10 per foot or less.

There are several localities in California where drilling in excess of the present depth record could be undertaken with good prospects of finding new petroleum reserves. The classic example is the Ventura field. Here the steeply dipping flanks assure closure even at great depth, and because the structure was formed through folding of the floor deposits of the world's deepest

Top of pages: A portion of the Long Beach field of California, a field that has been under almost constant development for more than 20 years. Old development is dated by the wooden derricks and standard pumping rigs

Left: One of the world's largest draw works. This equipment was used to drill three 13,130-ft. wells at Wasco under contract

in Drilling and California

Teritary basin, the beds are of great thickness. The deepest wells so far completed have not reached the top of the Miocene. Several times the Ventura field has held the drilling-depth record, and it is possible that at some future date it will have the world's first 20,000 or 25,000-ft. well.

Steam-Generating Plants

California uses the world's largest drilling equipment. One rig owned by Superior Oil Co. makes use of five 130-hp. locomotive-type boilers which deliver superheated steam at 500 lb. pressure. It is believed that this is the first instance in which steam pressures over 350 lb. have been used in the drilling industry. At 500-lb. pressure, the saturated steam temperature is 467° F., and with 100° of superheat, the steam is hot enough to char wood. Under heavy firing the five boilers are capable of delivery power to the hoist engine and pumps at the rate of about 1,500 b.hp.

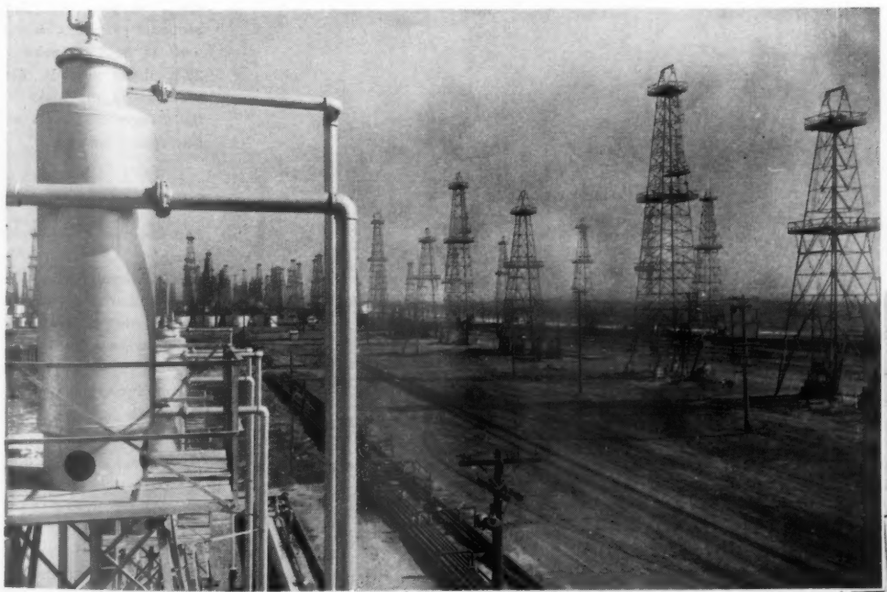
Continental Oil Co. uses a large unitized steam-generating plant consisting of two marine-type, water-tube boilers with complete facilities for condensing all of the exhaust steam for return to the boilers. The water-tube boilers are 13 ft. in over-all height and 8 ft. wide, but each is guaranteed to deliver at least 17,500 lb. of steam per hour at 350-lb. pressure. Based on heating surface alone, each boiler is rated at 175 b.hp., but under efficient firing the rating is exceeded by 310 per cent, and with excessively heavy firing even more power could be developed.

Within the marine-type boilers are banks of 2-in. and 1¼-in. water tubes which line the fireboxes. These are joined by headers at the corners through which steam is conducted to the separately fired superheaters. A single stack, 70 ft. high and 5 ft. in diameter, is used.

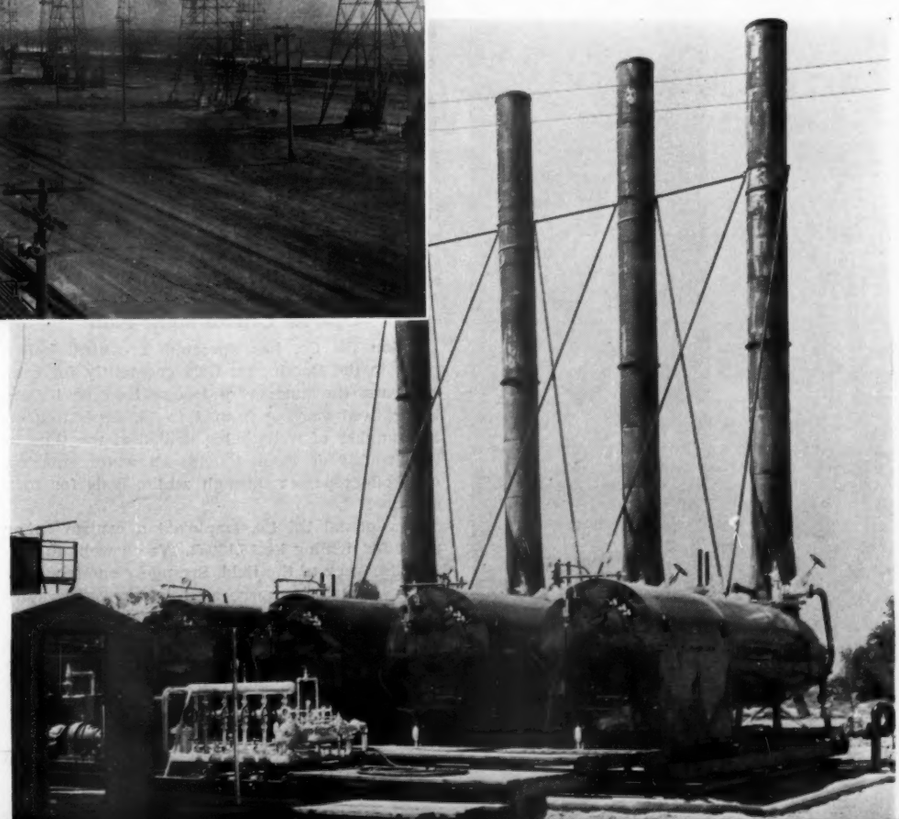
The temperature of the superheated steam is held at 550° F. or sightly higher, and as it passes from the superheaters to the rig it is metered so that a record can be kept of the rate of consumption, the temperature, and the pressure. This record makes it convenient to evaluate the various types of equipment as to steam requirements, and also aids in devising new practices for conserving steam.

Two 8-in. lines conduct the exhaust steam from the rig back to the boiler plant. These lines are not insulated, since it is desirable that as much steam as possible should condense in the return lines in order to reduce the back pressure against the exhaust ports of the engines and pumps at the rig. All steam must be condensed before it can be pumped back into the boilers.

At the boiler plant the returning exhaust steam, including exhaust from the boiler-feed pumps, passes through vapor-type oil separators to remove the cylinder oil picked up at the engines and pumps. It then enters a closed-coil condenser which is mounted on top of the feed-water tank to form a single skid-mounted unit. The condensate drops down into the feed-water tank and passes through a filter to remove any entrained grease before it enters the boilers. Continental



Above: Elevated separator at a well-kept lease in the Huntington Beach field. Note the layout of the lease lines in lower center of the photograph, including manifolds and footbridge. Being laid aboveground, corrosion is minimized



Right: Boilers used by Rocky Mountain Drilling Co. for drilling 13,130-ft. Wasco wells. Each insulated boiler is mounted on skids, and the skids are placed on a large steel frame or grillage to line up the units for easy connection

Oil Co. uses a special cylinder oil at all rigs where exhaust steam is condensed for return to the boilers. This is the type of oil used in steam-generating plants at laundries and is designed for complete separation from exhaust steam.

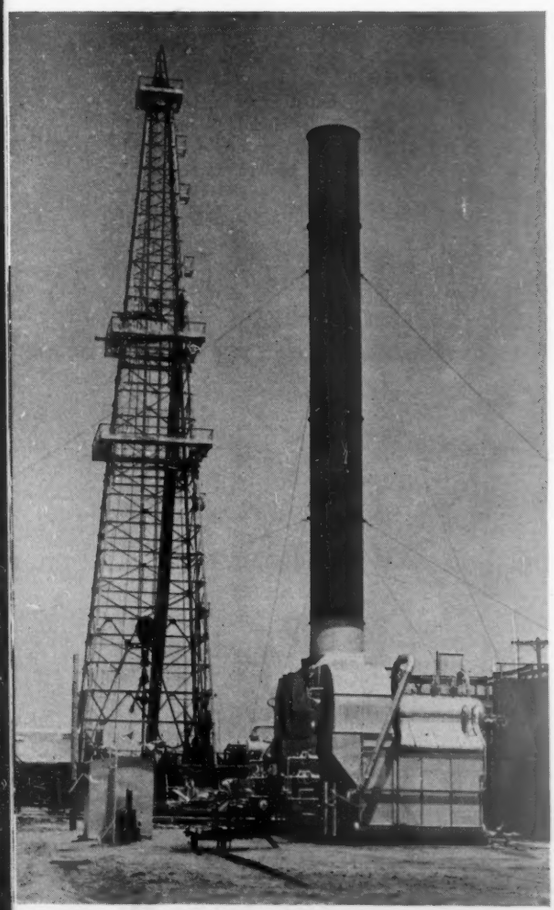
The steam condenser is cooled by circulation of untreated water, and this is in turn cooled by passing it over natural-draft cooling towers. Since considerable untreated water is lost by evaporation in the cooling towers, the system is not particularly suited to localities where water supply is a problem.

Within the closed steam system there is of course an appreciable water loss due to leaks and blowdowns. This loss is made up, as it is on ocean-going steamers, through the use of an evaporator to distill whatever water is available for supply. The steam from the evaporator is condensed in the main condenser, where it joins the exhaust steam from the rig. Heat is supplied to the evaporator in the form of live steam at 100-lb. pressure. An automatic control regulates the steam flow to the evaporator so that the make-up vapor will enter the condenser at the rate necessary to replace losses. By chilling the coils periodically, the hard-water scale is removed by the process known as exfoliation.

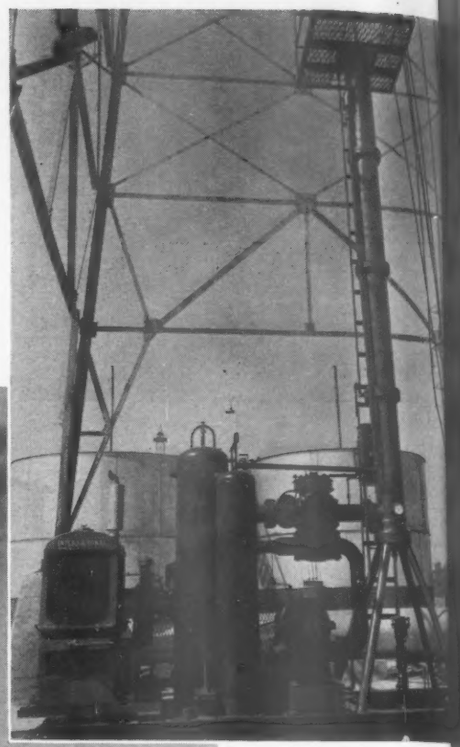
Although all water entering the system is distilled, frequent tests are made in order to direct treatments designed to correct excessive alkalinity, reduce oxygen content, eliminate entrained oil, and prevent hydrogen embrittlement.

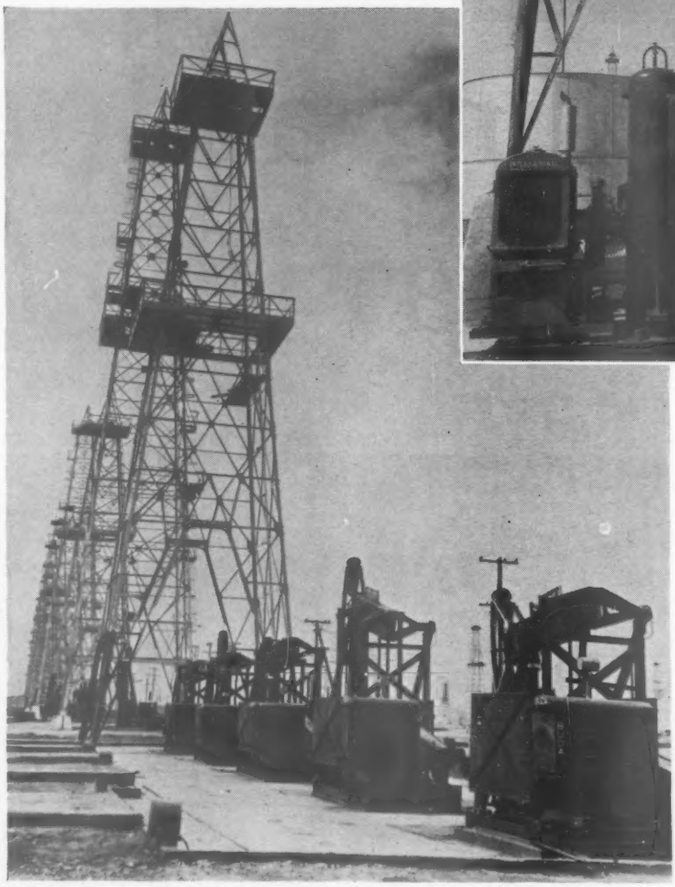
Unlike the usual oil-field boiler plant, it is seen that the marine-type installation has been equipped to effect maximum efficiency throughout its life, and all possible measures have been taken to extend its service as long as possible. The cost, it is understood, is comparable to other modern boilers of equivalent horsepower, and they are lighter per brake horsepower. The condenser system and the raw-water evaporating system must pay for themselves primarily by reducing the water-treating costs and by making it possible for two boilers to deliver a volume of steam for which three otherwise would be required.

Central boiler plants have been adopted by several California companies for drilling a number of wells at adjoining locations. In one instance a 1,600-ft. steam line was used from the boiler plant to the drilling well. On the other hand, at locations where the boiler plant is to serve only one well, there has been a notable tendency toward shortening the distance between boilers and derrick.



Below: Marine-type 100 per cent condensing steam-generating plant used by Continental Oil Co. At present it is in use at a deep test between Shafter and Wasco. Photo by A. H. Bell, general superintendent, Continental Oil Co.





Above: Hydraulic rod-actuating pumping unit in the Dominguez field. The sectional cylinder over the well is built to make a 20-ft. stroke possible. Air pressure in the tanks in the foreground serves as the counterbalance

Left: Compact, air-balanced pumping units used to pump directed wells on a neat California lease. The derrick is mounted on small wheels so that it can be moved on a track to serve any one of the five wells

Operate Central Boiler Plant

Union Oil Co. has operated a central boiler plant in the Dominguez field constantly for over 10 years, the number of locomotive-type boilers being fired varying from 4 to 14, depending on the number of wells being drilled at the time in the steadily developing field. All water entering the boilers passes through zeolite beds for softening.

Continental Oil Co. employed a central boiler plant for drilling its 13,130-ft. Wasco wells following discovery of the field. Strangely enough, only three portable superheated steam generators were used, rated by heating surfaces as 69 hp., but these enabled the company to establish a new speed record. The same company has been using two central boiler plants to drill up the entire San Miguelita field near Ventura in very mountainous terrain. Use of central boiler plants with long steam lines has followed the introduction of good insulating materials for lines, which made it possible to move the conduits without causing excessive disruption of the protective coat. Flange joints make it unnecessary to use tongs on the pipe.

The use of insulating material on boilers has become almost universal in California, a practice seldom followed in the Mid-Continent fields. Recently, a number of boilers have been insulated with expanded vermiculite. This is an altered biotite mica which, when mined, contains minute particles of water between its plates. When subjected to sudden heat the water changes to steam, expanding the mineral to about 15 times its original thickness. Since the expanded mineral is full of air cells, it is an excellent insulating medium, and a satisfactory method has been devised for covering boilers with a 1½ to 3-in. layer of the material. It is applied by hand as a loose plaster, and is held in place by wire mesh and an asphaltic coating.

Some of the new boilers in use are of welded

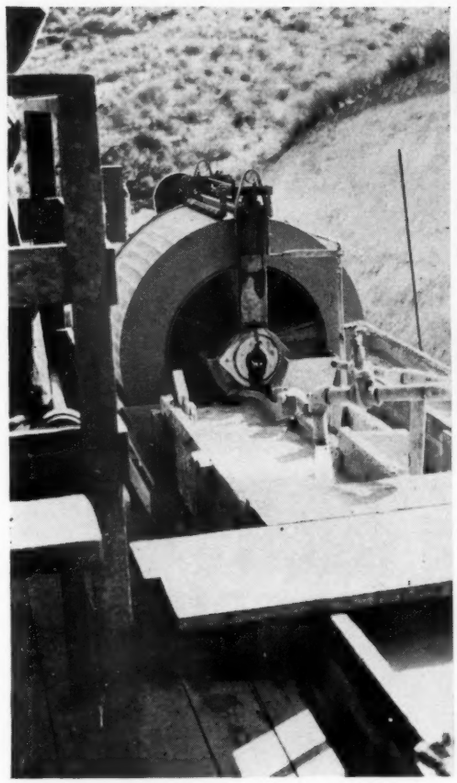
construction instead of having the usual riveted joints. This change in design, made possible by improved welding technique results in a saving in weight, which is especially important in the case of the large boilers as these often approach the load limits of the trucks that carry them to new locations.

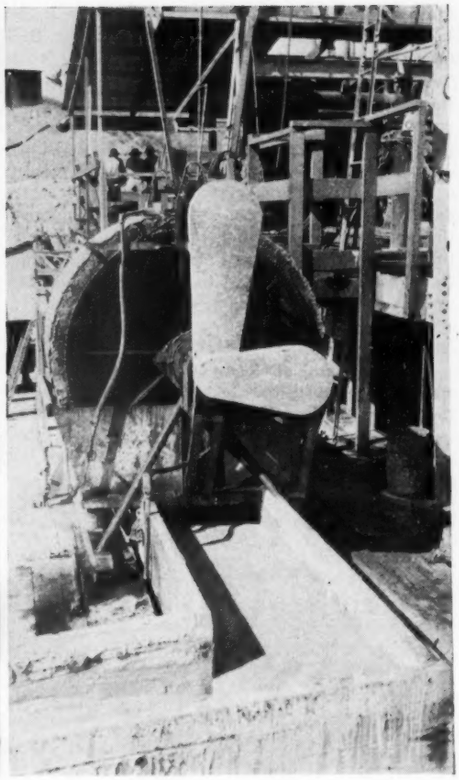
Low-pressure burners now in use have brought about greater firing efficiency, since combustion is complete within the firebox. Some operators are testing the stack gases for carbon dioxide content so that the air-gas ratio in the combustion chamber can be held within reasonable limits. Automatic apparatus for controlling water level in the boilers, rate of firing, and temperature of superheated steam have become standard equipment.

Most California oil operators now agree that there is no such thing as free gas. All natural gas produced above market demand can be used to best advantage by injecting it into an oil reservoir where it will serve to bring additional oil to the surface. So firmly has this new conception been fixed in the minds of operators that many have used this argument as a reason for adopting internal-combustion engines or electric power in place of steam power.

Drilling Mud

In drilling its Buena Vista Hills test to 14,622 ft., Honolulu Oil Co. spent $80,000 for mud. This figure may serve to indicate the importance attached to the drilling fluid during deep penetration. Within the past few years, it has become standard practice in California to handle all mud in tanks. Flat, rectangular tanks have almost entirely replaced the circulating pits formerly dug in the ground. Higher, cylindrical tanks have replaced the old storage pits. Steel mud troughs, which can be moved in several pieces from one location to another, have gained preference over the wood troughs that are constructed anew at each location. Two vibrating screens are used on practically all wells over 7,000 ft. and these are mounted permanently on top of one of the circulating tanks. Tanks and screens are moved as a single unit. At least one supply company has recognized this practice by manufacturing two 3 by 4-ft. screens which are mounted together on a single frame designed for easy installation over a mud tank.





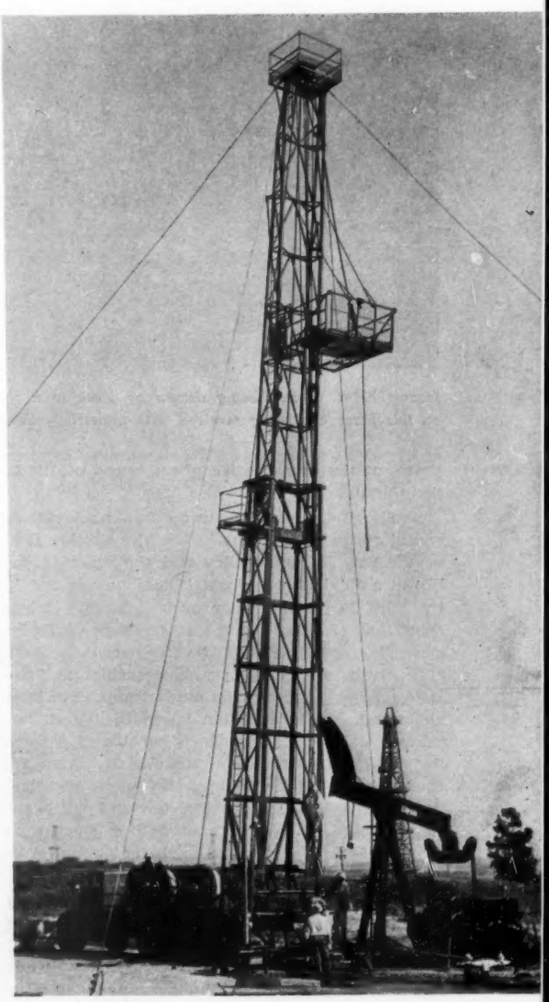
A rotating mud screen of new design used on a rig in the Del Valle field

One new type of screen for removing sand and cuttings makes use of a large drum which is wrapped with wire around the outside to form fine slots. The drum is rotated and vibrated by an electric motor. Mud enters the inside of the drum through a hopper-like arrangement and passes through the mesh into a lower trough. Rollers at the top of the drum, made of rubber and fabric, force the cuttings that become lodged in the slots back into the drum so that they can be discharged from the interior with the other cuttings.

A number of California rigs now use a type of centrifugal desander in which the fluid is pumped in at high velocity by a motor-driven centrifugal pump located outside of the mud chamber. In circulating within the chamber the sand is driven to the outside so that it finds its way downward to the bottom of the cone-shaped vessel, where it is taken off through an orifice of selected size. A small jet of water just above the orifice helps to wash the sand from the mud. A small but steady stream of sand, so fine that it has passed through the vibrating screens, is thus removed from the bottom of the chamber with little escape of mud.

In using the desander described above one company follows a definite routine in preparing to make a round trip. Shortly before the pipe is to be pulled, anhydrous tetrasodium pyrophosphate is added to the mud entering the hole in order to reduce viscosity. This makes it possible to use the desander more effectively in cleaning the mud of its sand content. With desanding completed, the viscosity is built up by adding Aquagel immediately before the pipe is pulled so that the

A popular type of samson post for deep wells in California. By using the ladder as a brace for both tension and compression loads, the design is simplified



Right: Preparing to pull rods and tubing in the Santa Maria field of California. The truck uses a 198-hp. engine

sand and cuttings remaining in the mud will be held more positively in suspension during the time that the pipe is out of the hole.

Circulation rates for drilling fluid have been increased as faster rotating speeds and a greater concentration of weight on the bit have been employed. It is widely recognized that there is balance to be obtained between weight on bit, speed of rotation, and rate of circulation, if the greatest drilling efficiency is to be obtained in a particular formation. In other words, little is accomplished by increasing the rotating speed if the fluid rate is not sufficient to wash away the cuttings.

Largest Slush Pump

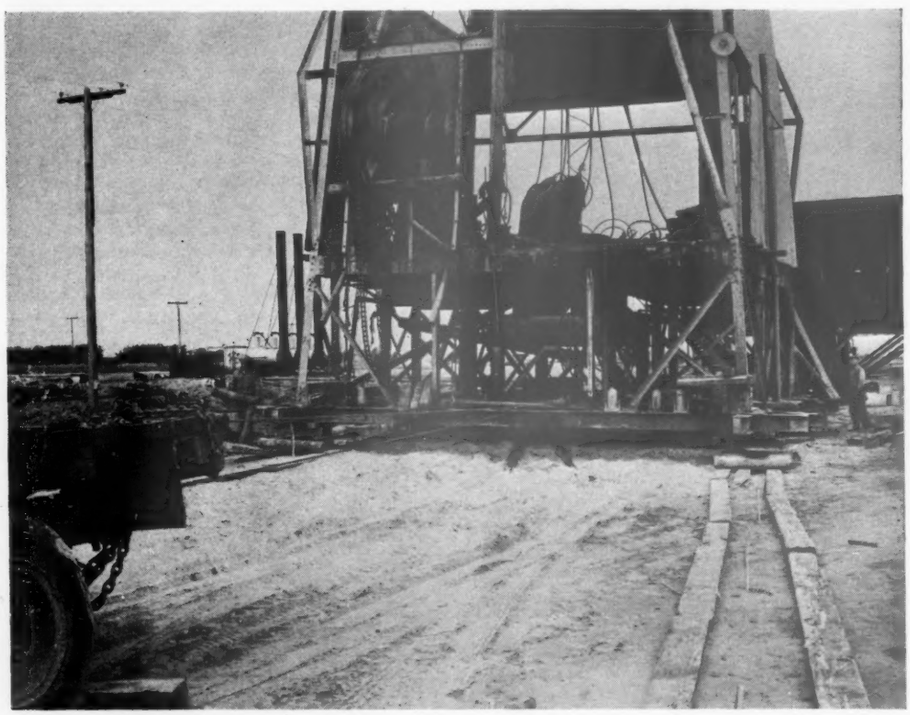
Rocky Mountain Drilling Co. has been using a specially manufactured slush pump believed to be the largest in the world. It is a 19 by 9¼ by 22 in. duplex steam pump capable of delivering 700 g.p.m. at the conservative piston speed of 100 ft. per minute.

Shell Oil Co., Inc., is using two triplex horizontal steam pumps, one in the Ten Section field of the San Joaquin Valley and the other in the Ventura field on the coast. These pumps are 18 by 7 by 20 in., but their over-all length is less than that of other pumps of the same cylinder size. Their newly designed valve mechanism enables them to operate on a short cushion and the rods connecting steam and mud pistons have been shortened. Under a piston speed of 100 ft. per minute one of these pumps is capable of delivering 640 g.p.m. if the oversized 7¼-in. liners are used. Through the use of a five-piece cast-steel mud end and a semisteel steam end sufficient strength is obtained without adding greatly to the weight of the conventional duplex pump of like cylinder size.

The object of the new large-capacity pumps is to make it practicable to drill with one pump where two pumps of the conventional size would have been necessary. A standby pump is always on hand, and this is sometimes compounded with the large-volume pump. Under ordinary conditions, the large pumps are believed to have sufficient volume to balance even the large rigs where high rotary speeds and a number of drill collars are used.

Experiments have resulted in better control of mud viscosity where high well temperatures are encountered. Most California rigs undertaking deep drilling are now equipped with testing apparatus for water-loss determination. This equipment is often capable of making the tests at the known conditions of temperature and pressure existing in the bottom of the hole.

A patented oil-base drilling fluid is being used in some instances by Shell Oil Co., Inc. Developed by Shell Development Co., the principal liquid ingredient is stove oil of 38° gravity with a pour point of between 30° and 35° F. and a Saybolt Universal viscosity of 33 seconds at 100° F. To this is added calcium carbonate in the form of pulverized oyster shells which are ground so fine that 85 per cent of the powder will pass through a 200-mesh screen. Another additive is lamp black, the purpose of which is to impart gel strength. Air-blown asphalt with melting point of 225° F. (10-20 penetration) is used to give the fluid greater plastering quality. As with water-base mud, weight is obtained through addition of barytes. Pulverized mica is sometimes added to either oil or water-base mud, since it has been found that the thin platy particles are effective in preventing lost circulation in the more porus sands.



Heavy 126-ft. derrick being drawn by truck to a new location in the Huntington Beach field. The 33 wells on this lease are being serviced with a derrick-pulling unit, since there are no permanent derricks

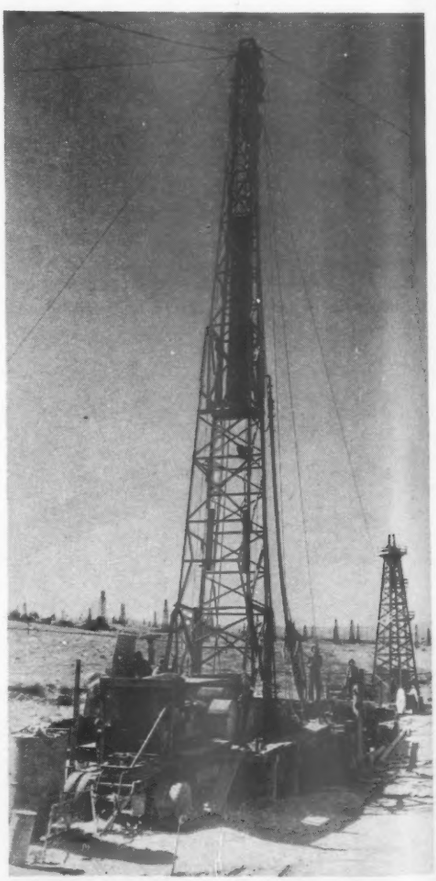
Derricks

A new type of derrick is quite widely used in California and in those foreign fields for which equipment is ordinarily purchased in California. It is a 136-ft. derrick with a bulge on one side extending from the third girth to a point above the fourble board. This bulge makes it possible to place three or four more rows of drill pipe back of the finger board. Thus the 136-ft. derrick provides about as much pipe-racking space as the 150-ft. derrick of standard design.

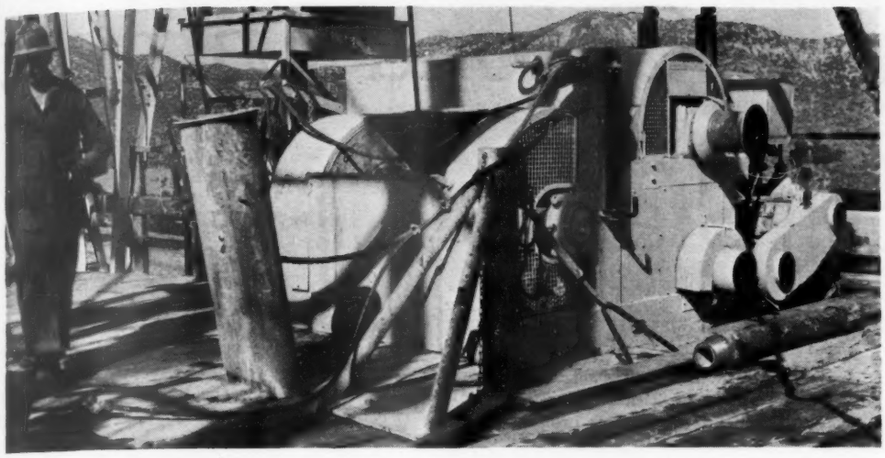
The 178-ft. derrick is still favored for drilling to depths of 11,000 ft. or deeper. There is, however, some question in the minds of many operators as to whether or not these tall derricks are of sufficient advantage to justify their additional first cost together with the added expense of erecting. It was noted that in drilling three 13,130-ft. wells for Standard Oil Co. of California in the Wasco field, Rocky Mountain Drilling Co. made its best time in drilling 4 Mushrush, which was completed in 73 days using a 136-ft. derrick. The two other wells were drilled under 185-ft. derricks, and required 88 and 86 days, respectively. Nevertheless, it would be wrong to draw definite conclusions from these data. The contractors state that trips with the 136-ft. derrick required more time than with the 185-ft. towers, but because much easier drilling was encountered, fewer trips were necessary.

The large concrete cellars, common in the days when large-scale drilling was in progress in the Kettleman Hills field, are no longer used. Digging and concreting costs are saved by using high derrick floors with smaller cellars. Eight-foot floors have been common for some time and the 12-ft. floor is finding wider acceptance. The high floors were formerly mounted on derrick substructures, but now these have been largely replaced by the use of derricks with extended legs.

Costs have been further reduced at some locations through the use of timber mats to replace concrete derrick corners. The timbers making up these mats are reused at many locations. Shell Oil Co., Inc., the company that introduced this practice, supplements the savings by skidding the derrick with equipment intact to the new location. Special equipment has been developed for



A modern portable drilling rig at work in the old Midway field of California. The wells in the background have been producing for 30 years



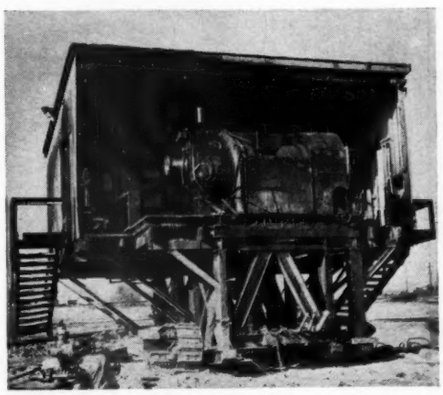
A standby hoist with individual engine used on one of California Western Oil Co.'s rigs in the Del Valle field

moving the derricks. Each corner is placed on a set of track-laying wheels so that the derrick can be drawn by a tractor. A heavy framework or grillage is used below the derrick floor at ground level. This supports the underfloor-drive engine for the rotary table and other equipment, both on the moving trucks and on the timber mats.

For drilling the shallower wells, Shell has built a rig on which the track-laying wheels are a permanent part of the derrick. The rig is moved in three parts, the largest of which is the derrick-hoist-and-engine unit. The derrick is the 87-ft. size of standard design mounted on an 18 by 18 ft. square steel base, which is floored with wood planking. This heavy unit has a steel wagon tongue on the front wheels so that it can be drawn and turned around in a short radius by a tractor. The steel derrick corners are split so that they fold up under the floor while the move is made. At the location the two parts of each corner are bolted together and are rested on timber mats to support the derrick. This derrick unit has been designed in intricate detail and includes connections for the cementing truck, water lines, fuel lines, and all other facilities for the complete drilling task. The other units making up the rig consist of a 16 by 40 ft. platform and a pump-and-engine assembly, both of which are mounted on track-laying wheels. The platform is used beside the derrick for handling drill pipe and casing, and during moves it is used as a flat car for transporting the drill pipe and other equipment. Power for the hoist and pump is furnished by internal-combustion engines operating on butane. The rig has been in use for several months in the Mount Poso field, but it can be divided into 8-ft. sections and transported by truck or railroad car.

Weight on Bit and Rotating Speeds

The practice pioneered some years ago by Superior Oil Co. whereby a series of heavy drill collars is used above the bit is still widely used, but some companies have been notably successful is using a modified adaptation of this practice. The record of the Robert S. Lytle interests in the Coalinga Nose field can be cited as an example of a large drilling program which has been carried on with unusual success. Over a period of 3 years the company has been engaged in continuous drilling, completing more than 50 wells in the field. Although it has encountered minimum trouble, drilling technique has been constantly improved. Operators now use about 80 ft. of drill collar with a reamer at the top. More importance is attached to the use of reamers with long drill collars than formerly. For drilling the surface hole to a depth of 600 to 700 ft. a 17½-in. reamer is used on 8-in. o.d. drill collars. From the casing shoe to a depth of 6,800-7,800 ft. a 12¼-in. reamer is used on 8-in. drill collars. After the 8⅝-in. casing has been set, a 7⅞-in. reamer is used on 4-in. pipe to drill the oil-bearing strata,



With stairways hoisted slightly, this draw works-engine unit of a steam rig has been mounted on track-laying wheels and is being towed behind a truck to a new location

which has a maximum thickness of about 650 ft. Rotating speeds during drilling average about 250 r.p.m.

One California operator has experimented with rotating speeds up to 700 r.p.m., and it was claimed that better penetration rates resulted without increase in equipment failures provided that nonsynchronous rates were selected so that vibrations would not be amplified. Nevertheless, there seems to be a trend toward slower rotating rates. The most general practice now is to use rates of about 300 r.p.m. in drilling the top portion of the hole, but as drilling progresses the speed is reduced. Experiments made at Coalinga Nose showed that faster penetration was obtained at speeds of 175 to 250 r.p.m. than at a speed of 400 r.p.m. However, since tests of this kind are closely related to the type of formation and the rate of mud circulation, they are not necessarily conclusive.

Use of the high rotating speeds, either experimentally or otherwise, has resulted in much greater power being supplied for driving the rotary table. Most heavy steam rigs of late design in the California fields have available about 350 hp. for driving the table. This is usually supplied by an individual steam engine. One operator uses a new-type rotary drive in which a 12 by 12-in. vertical engine is located beside, but not under, the derrick floor. A shaft from this engine runs under the floor and drives a chain to the table sprocket.

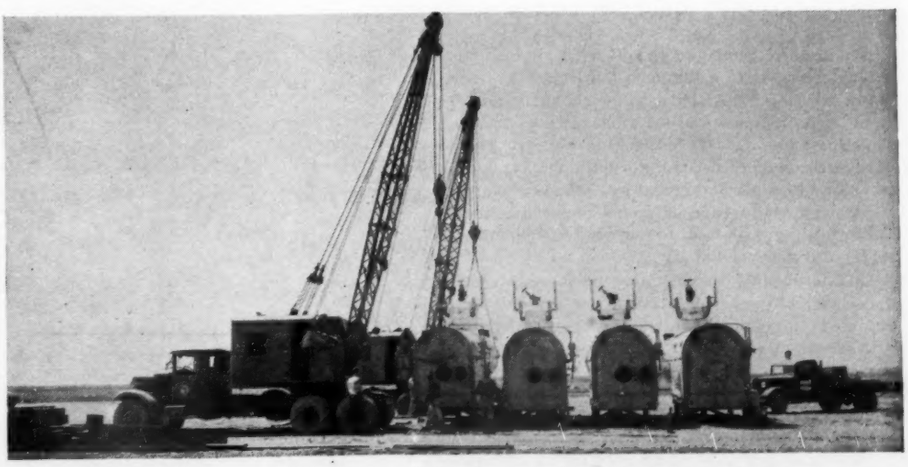
Internal-Combustion Engines

The most striking of recent changes in California drilling practice is the greatly increased use of internal-combustion engines. In many of the newly developed areas, such as Newhall and Mount Poso, all drilling is carried on with internal-combustion engines, save for the electrical rigs in use. Most California operators regard steam as the ideal power for drilling, and originally accepted the use of internal-combustion engines only for the shallower wells in localities where water was scarce. The economy of these engines led to their wide acceptance. On a recent test three 185-hp. diesels used 17 gal. of oil per hour at a cost of 5 cents per gallon.

For the most part, the internal-combustion engines are used for drilling to depths of less than 7,000 ft., but this is not always the case. One modern "spark plug" rig established a good record in drilling below 11,000 ft.

For shallow California drilling a new type of rig is finding popularity, and almost every major company has acquired one within the past year. It is a rubber-tire-mounted portable rig which carries its own telescoping derrick. Its hoist is powered by a large internal-combustion engine which is usually operated on butane. The entire rig is designed to meet California road restrictions so that with its derrick folded over the hoist, it can go anywhere on the highways as a trailer behind a derrick. Its pump is carried on a second tire-mounted unit, being driven by another

(Continued on Page 106)



Setting boilers for an 11,000-ft. test in the San Joaquin Valley. Two large cranes are lowering boiler into position

California . . . Second Largest Oil-Refining State

By W. T. ZIEGENHAIN

California refiners hold a key position in the present emergency. Despite the loss of foreign and domestic markets through freezing of money credits and federal commandeering of tankers the state's refining industry is due to expand. This expansion, however, will take the form of adding intricate fractionating equipment and alkylation units in its present plants instead of adding materially to the crude capacity.

THE 56 refineries operating in California account for approximately 18 per cent of the total crude capacity among all plants in the United States. California also has approximately 30 small refineries which are idle. Despite this relatively large number of shutdown plants, California is exceeded in refinery operating capacity only by the State of Texas.

At the present time California operating capacity stands at 810,700 bbl. per day, as compared with a total of 4,534,775 bbl. for the United States. The idle capacity stands at 160,000 bbl. per day and represents approximately half of the total idle capacity throughout the country.

The state's refining industry has developed to its present great position because of three factors. Most important, California for many years has yielded substantial quantities of refinable crudes. Secondly, water transportation has afforded a cheap means for distributing the refined products. Third, California refiners have enjoyed almost a monopoly on the Pacific foreign business.

In the present emergency, however, California refiners find themselves stripped almost completely of the Pacific foreign business by reason of the freezing of Japanese credits. Also California companies have had to contribute to the fleet of tankers commandeered for British service. The latter factor has greatly reduced the customary substantial shipments of products to the eastern and Gulf Coast states from California.

Aviation Gasoline

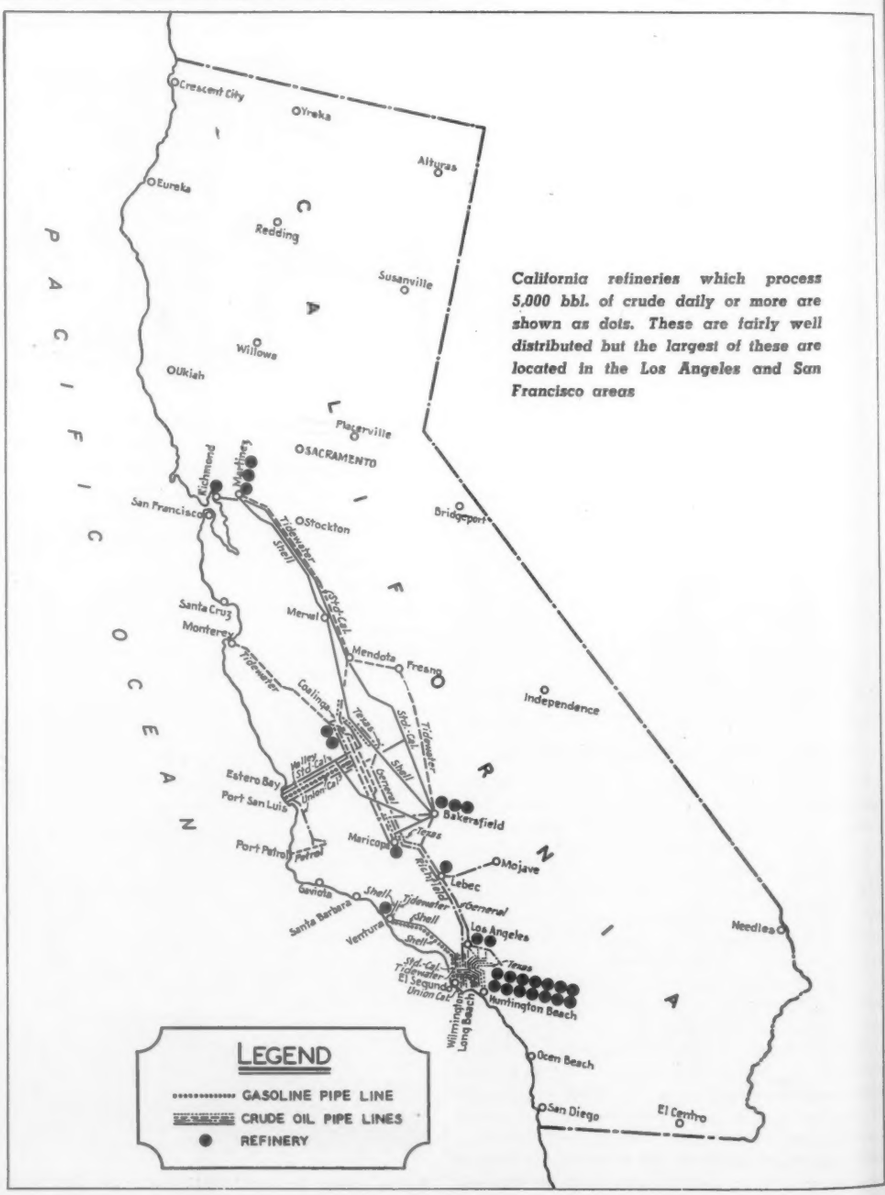
One compensating factor does appear on the horizon, however. California refiners may be given a preference in building up capacity to manufacture aviation gasolines as a result of the naturally high octane value of California straightrun fuels. Just how important this factor will become remains to be seen but California could easily be expected to provide an additional 50,000 bbl. of aviation gasoline daily within the year, and without materially disrupting current operations. It will, however, entail expenditures of large sums of money.

It will be remembered that recently the oil coordinator's office estimated that capacity for manufacturing 100-octane gasoline should be raised from approximately 40,000 bbl. at present, to something like 120,000 bbl. within a year. This, of course, would necessitate building catalytic cracking units, alkylation and isomerization plants at strategic points and it seems reasonable that California be expected to supply a substantial share of this capacity.

This 100-octane gasoline may be made in several ways. The most practical under present conditions is to blend about 60 per cent alkylate, with 25 per cent selected straightrun and 15 per cent isopentane to which tetraethyl lead is added. It soon becomes obvious that the higher the octane value of the straightrun the more it can be used in the blend.

Since California straightrun gasoline has a higher octane value than the average of such gasoline produced over the country it certainly will be favored as long as it is necessary to conserve alkylate, and there can be no denial that more alkylate plants must be built if the volume of 100-octane gasoline is to be greatly expanded.

California, of course, already provides large quantities of aviation motor fuel. It has been a principal source of 100-octane aviation gasoline. When and if refining capacity is needed to produce more, the state could apparently produce the crude needed without materially altering its present production routine. As a matter of fact, the state is already producing approxi-



California refineries which process 5,000 bbl. of crude daily or more are shown as dots. These are fairly well distributed but the largest of these are located in the Los Angeles and San Francisco areas

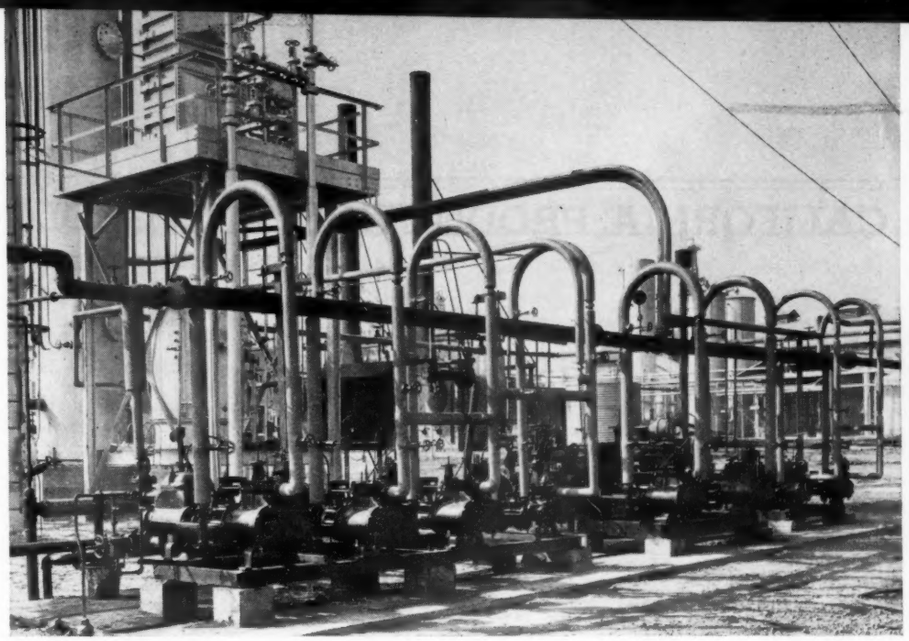
mately 80,000 bbl. more crude oil daily than its refineries are running. Its daily average production approximates 630,000 bbl. while the refinery runs are but 550,000 bbl.

California refiners also hold a sizable backlog of crude stocks. In all, there is approximately 32 million barrels of refinable crude in storage. Nine million of this is at refineries and 23 million barrels at tank farms and in pipe lines. While further additions to stocks could prove to be costly and could be interpreted as uneconomic, the present situation certainly could not be viewed with great alarm especially if the Pacific Coast is faced with the emergency outlined by many of our national leaders.

In addition to these refinable crude stocks, there is at refineries approximately 14 million barrels of gasoline, 64 million barrels of residual fuel oil and 13 million barrels of gas oil and distillate. The relatively large stock of residual fuel oil, of course, is practically all bunker fuel for use in fighting or merchant seacraft. For this reason the relatively large stocks of residual fuels cannot be viewed with alarm, even though they are large. Fortunately, stocks of these oils do not deteriorate with time by evaporation or otherwise.

Until the present emergency, substantial quantities of all types of oil left California refineries weekly for ports along the Atlantic and Gulf coasts. The present shortage of tankers has curtailed this movement to a great degree, however, the present shipments are almost negligible. During the first 8 months of 1941 the shipments represented only 70 per cent of the volume shipped in the same period in 1940. Elsewhere in this issue a much more detailed record of refined oil shipments appears. It might be interesting to note that practically all of the oil which did go from California refineries in recent months to the East Coast markets moved in tankers transferred to the British. The California oil was taken to the East Coast to help relieve any possible future shortage of oil there. Use of the tankers in this manner satisfied in part a dual objective.

Another major reduction in tanker shipments from Pacific refineries is represented by the loss of Japanese business following the freezing of Japanese credits.



Modern installation of pumps for service without building protection. Another typically Californian feature

Presumably, in anticipation of such a move, however, shipments over the early part of 1941 from California to foreign Pacific markets were substantially increased. Therefore, the experience gained in the first 8 months of this year probably would not serve as a sure index of what the business would be under normal times. In the past 8 months 27,213,695 bbl. of oil have been shipped from California ports to foreign Pacific markets. Of this, approximately 8 million barrels was crude oil, 5 million gasoline, 11 million fuel oil and diesel oil and 2 million barrels kerosene. The high mark for the period was reached in May when 4,552,034 bbl. of all oils were shipped.

With adjustments of this magnitude to be digested by the California refining industry, the need for flexibility in plant operations becomes readily apparent. This flexibility is being supplied to an ever-increasing extent through the installation of auxiliary equipment and by the major plants rather than by opening up and shutting down scattered plants. As a result of this process, many of the 30 idle California refineries will never operate again without major revisions.

As the need for motor fuel of higher octane values grows and if the need for substitute rubber, synthetic glycerin and certain other products, tend to increase, the large California refineries offer a most logical opportunity for this expansion.

To some degree this practice is already in operation. California refiners already supply a large part of our cracked motor fuels and have been identified as leaders in research for the production of synthetic glycerin, toluene, ammonia and many of the commercial alcohols and ketones. Since thermal cracking is an index, some idea of the extent to which synthesis has already been adopted in California may be gained from the fact that 11 per cent of the 32.2 per cent gasoline recovered by these refiners is cracked gasoline.

Considering the speed with which California refineries have applied the use of cracking to synthesize motor fuels and knowing the potentialities of these plants for manufacturing other products by synthesis, under the present emergencies, further expansion of refining operations along these lines seems highly probable.

Typical large California refinery showing step-by-step expansion of plant facilities

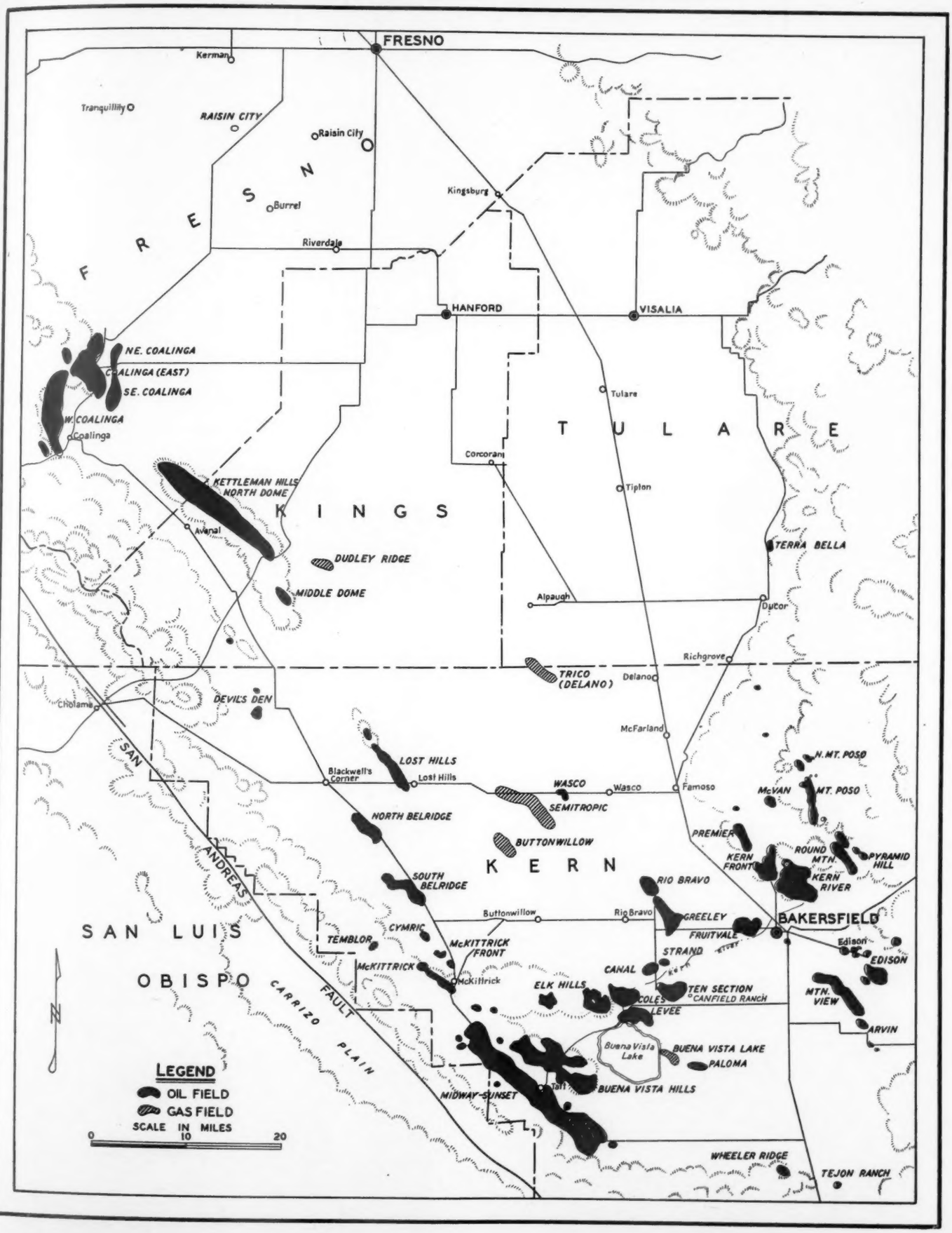
CALIFORNIA PRODUCTION AND GEOLOGICAL CONDITIONS

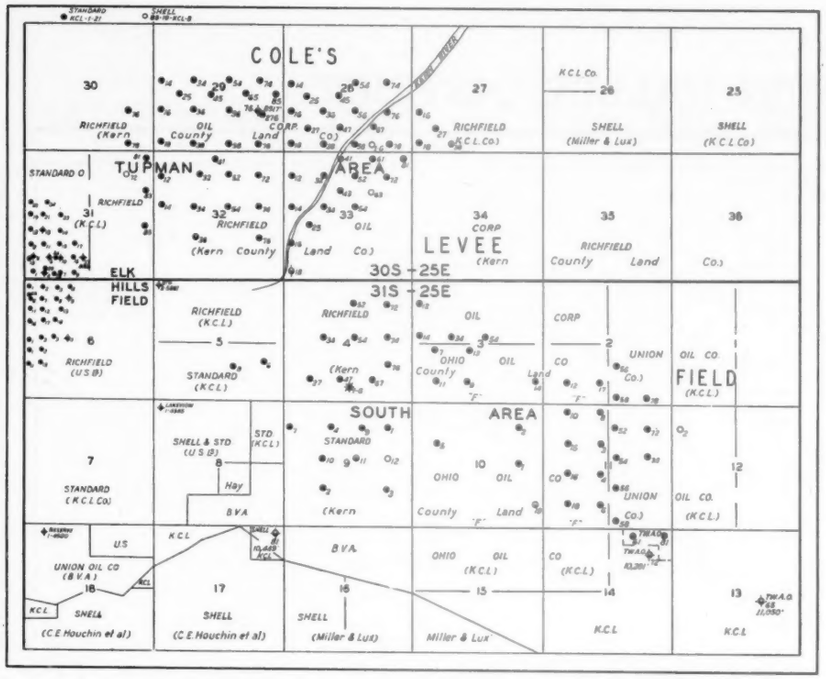
SAN JOAQUIN VALLEY DISTRICT

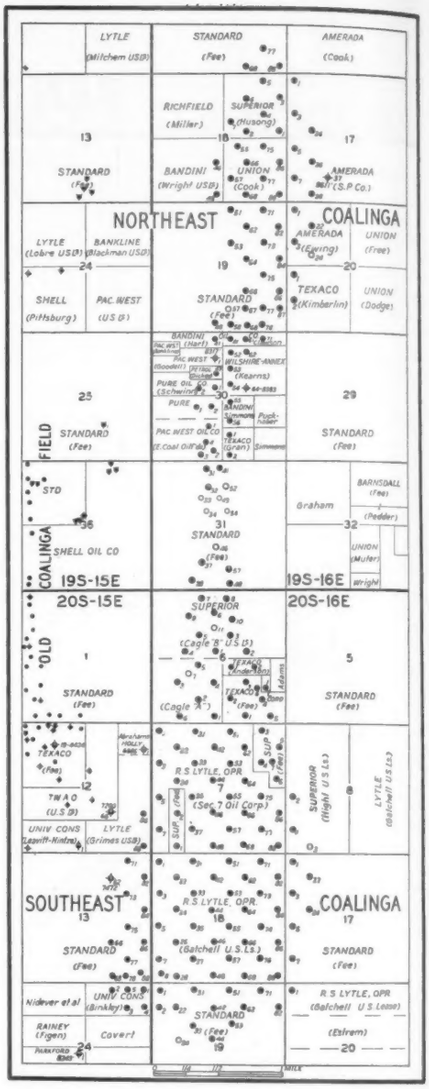
Field and county—	Discovery month and year	No. of producing wells 9-30-41	Current daily average production	Cumulative production 8-31-41	Gravity of oil	Type of structure	Average zone thickness	Depth range
ARVIN, KERN:								
Chanac (P)	2-39	15	590	1,270,720	28-30	Faulted monocline	125	7,295- 370
BELRIDGE—NORTH, KERN:								
Shallow (P)	6-12				12-22	Anticline	105-420	795-4,180
Temblor (M)	10-30	84	10,326	42,053,629	33-45	Anticline	500-650	5,384-6,034
Wagonwheel (E)	6-32				34-60	Anticline	500	8,062-8,500
BELRIDGE—SOUTH, KERN:								
Shallow (P-M)	4-11	207	2,112	22,883,807	20-29	Two domes	105-420	628-1,300
CANAL:								
Stevens (M)	11-37	35	5,152	5,996,515	35-37	Anticline	260	8,065-8,333
CANFIELD RANCH, KERN:								
Stevens (P)	1-38	1	42	83,042	28	Limited sand lens	100	8,072
COALINGA—EAST, FRESNO:								
All pools (P)	1887	190	9,476	220,603,334	12-24	Plunging anticline	338-740	1,199-4,270
COALINGA—WEST, FRESNO:								
All pools (M)	1901	651	5,205	145,930,749	12-17	Overlapped monocline	400	450-3,380
COALINGA—NORTHEAST, FRESNO:								
Gatchell (E)	4-39	69	9,828	3,942,465	29-40	Possible shoreline	125-350	8,022-8,290
COALINGA—SOUTHEAST, FRESNO:								
Gatchell (E)	7-38	130	18,902	10,956,398	28-36	Possible shoreline	350-900	7,150-8,050
COFFEE CANYON, KERN:								
Vedder (M)	5-27	72	1,478	9,269,619	15-17	Faulted monocline	17-60	1,575-1,810
COLES LEVEE, KERN:								
Stevens (M)	11-38	47	7,067	3,074,289	33-60	Anticline	200-400	8,800-9,950
EDISON, KERN:								
First Duff (P)	1-34	97	2,434	8,226,724	14-21	Monocline	150	1,048-2,170
Second Duff (P)	5-34				16-29	Monocline	175	2,880-4,450
ELK HILLS, KERN:								
Carmen (P)	1-19	184	6,903	156,966,516	35-38	Anticline	1,000	3,050
Tupman (P)	2-20				16-30	Anticline	250	2,950-3,450
FRUITVALE, KERN:								
Martin-Kernco (P)	2-28	169	5,801	23,976,657	17-25	Deltaic sand lenses	400	3,300-4,175
San Margarita (M)	11-29				17-19	Deltaic sand lenses	75	4,700
GREELEY, KERN:								
Rio Bravo (M)	12-36	56	7,352	5,494,561	34-38	Anticline	75	11,250-11,464
Vedder (M)	6-38				37-41	Anticline	150	11,350-11,510
KERN RIVER FRONT, KERN:								
Kernco (P)	8-25	398	6,176	46,834,149	13-16	Faulted monocline	50-400	1,465-2,650
KERN RIVER, KERN:								
Old field (P)	6-99	1,416	5,126	280,623,013	11-15	Monocline	275	320-1,250
KETTLEMAN MIDDLE DOME, KINGS:								
Temblor (M)	6-32	0	Shut in	544,491	33-55	Elongated dome	1,000	7,830-8,940
KETTLEMAN NORTH DOME, FRESNO-KINGS:								
Temblor (M)	10-28	269	38,577	247,664,844	34-55	Elongated dome	1,250	7,035-8,950
McAdams (E)	7-37				45-55	Elongated dome	400	10,350-10,750
LOST HILLS, KERN:								
Main sand (P-M)	7-10	307	3,520	52,111,228	14-26	Plunging anticline	225	469-2,080
Williamson (P)	6-36				14-16	Plunging anticline	150	1,100-2,500
McKITTRICK, KERN:								
Cymric (P)	Unknown				11-15	Monocline	50	1,212-2,625
McKittrick (P)	5-87	215	3,973	92,111,502	12-15	Mono. and overturned anticl.	60	433-1,325
McKittrick Front (P)	Unknown				12-15	Anticline	125	970-2,480
Temblor Ranch (P)	7-00				11-15	Anticline	25	343
MIDWAY-SUNSET, KERN:								
Buena Vista Frant (P)	Unknown				23-28	Isocline	30-50	2,905-4,510
Buena Vista Hills (P)	8-09				22-31	Two anticlines	30-75	2,660-3,950
Lakeview (P)	3-10				20-24	Buttress sands	160	2,375-2,950
Maricopa Flat (P-M)	9-28				18-27	Nose, overlap & contact	25-100	2,615-3,850
Midway—East (P)	Unknown	2,703	48,286	906,900,811	18-20	Anticline and syncline	50-135	1,830-5,250
Midway—West (P)	5-01				11-27	Anticline and monocl.	25-150	540-2,500
Quality Area (P)	5-36				14-17	Anticline	100	1,980-2,050
Republic Area 1 (P)	3-28				13-21	Sand lens	100	2,900-3,060
Republic Area 2 (M)	6-40				15-17	Sand lens	50-60	1,770-1,890
Gibson Area (M)	3-36				20-22	Anticline	125	2,800-2,940
MOUNTAIN VIEW, KERN:								
Northwest area:								
Hood (P)	4-34				21-22	Faulted monocline	25-135	5,065-5,360
Wharton (P)	3-34				21-32	Faulted monocline	250	5,320-5,690
Southeast area:								
Hood (P)	10-33	164	4,954	39,363,652	22-30	Faulted monocline	200	5,575-6,294
Nichols (P)	7-34				26-28	Faulted monocline	160	5,232
Wharton (P)	5-33				28-34	Faulted monocline	250-400	5,685-6,240
Symons area:								
Wharton (P)	11-35				30-38	Faulted monocline	200-250	5,870
MOUNT POSO, KERN:								
Dominion (M)	12-28				14-16	Faulted monocline	65	1,525-1,600
Dorsey (M)	9-28				14-15	Faulted monocline	25-30	1,525-1,550
Glide (M)	7-35				15-16	Faulted monocline	60	1,560-1,690
Main field, first Vedder (M)	7-26	309	13,147	53,706,725	14-17	Faulted monocline	20-75	1,515-2,045
Main field, second Vedder (M)	1-23				16-17	Faulted monocline	60-85	1,750-1,950
McVan (M)	3-32				11-14	Monoclinal overlap	100	1,150-1,250
Premier (M)	4-29				12-14	Monoclinal overlap	165	2,600-2,820
PALOMA, KERN:								
Stevens (M)	8-39	0	Shut in	186,118	49-55	Anticline	300-500	9,940-10,752
PANOCHE, FRESNO:								
Cheney (C)	1-41	0	Under geol. study	Nil	50	Undetermined	75	7,277
PYRAMID HILLS, KINGS:								
Alferitz (M)	6-31	0	Nothing	Nil	16-18	Anticline	75	1,000-2,650
RAISIN CITY, FRESNO:								
Properties (M)	6-41	2	409	9,275	23-30	Anticline	50-150	4,400-5,500
RIO BRAVO, KERN:								
Rio Bravo (M)	11-37	91	13,032	11,176,814	30-32	Anticline	75-125	11,225-11,350
Vedder (M)	11-37				31-35	Anticline	100-160	11,350-11,510
ROUND MOUNTAIN, KERN:								
Jewett (M)	4-28				20-23	Faulted monocline	450	1,615-1,950
Pyramid (M)	5-37	160	6,401	20,973,128	16-17	Faulted monocline	100	1,800-1,900
Vedder (M)	5-27				16-18	Faulted monocline	40-150	1,800-2,360
STRAND, KERN:								
Stevens (M)	6-39	11	1,525	1,008,470	32-35	Anticline	50-100	8,250-8,700
TEN SECTION, KERN:								
Stevens (M)	6-36	108	15,387	13,673,181	30-36	Elongated anticl. dome	100-250	7,800-8,300
TUPMAN, KERN:								
Stevens (M)	11-38	52	8,565	3,859,322	30-38	Anticline	100-350	8,750-9,400
UNION AVENUE, KERN:								
Roberts (M)	2-41	1	76	29,961	15-16	Undetermined	50	5,200-5,500
WASCO, KERN:								
Rio Bravo (M)	4-38	13	1,770	1,518,417	32-37	Anticline	50-125	13,100-13,300
WHEELER RIDGE, KERN:								
All zones (M)	11-22	34	280	3,887,437	22-26	Narrow anticline	100-300	2,540-2,960
Total San Joaquin Valley		8,260	263,872	2,436,911,564				

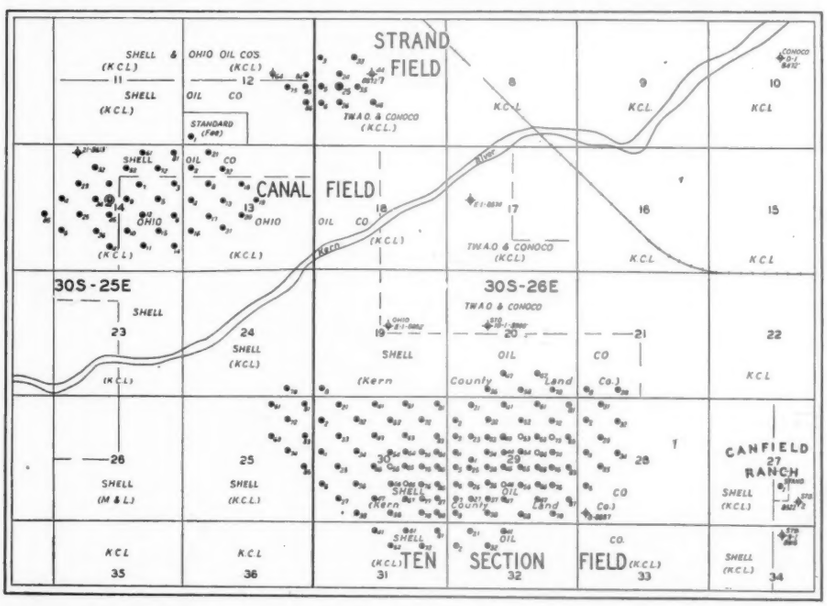
Note: Letters (C), (E), (M), and (P) following names of fields or producing zones designate age in this order: Cretaceous, Eocene, Miocene, and Pliocene.

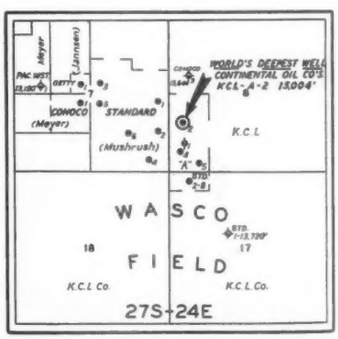
SAN JOAQUIN VALLEY DISTRICT



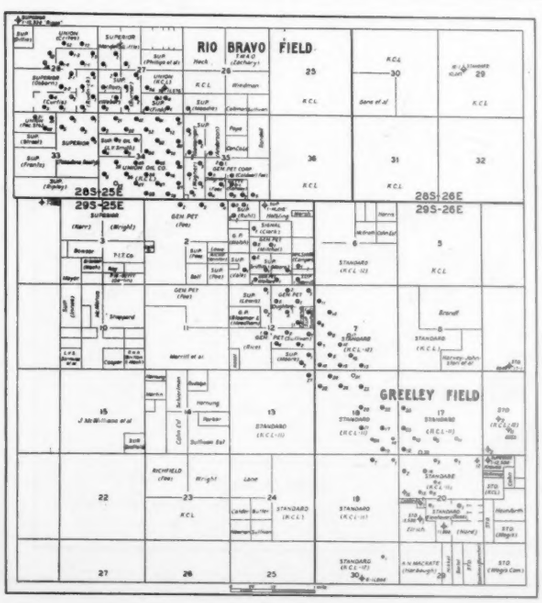


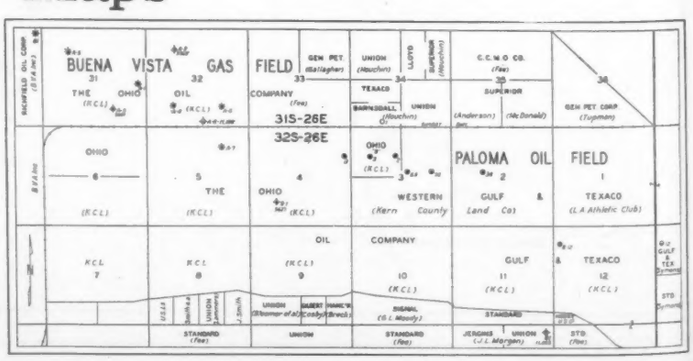






San Joaquin Valley Detailed Field Maps





CALIFORNIA PRODUCTION AND GEOLOGICAL CONDITIONS

COASTAL DISTRICT

Field and county—	Discovery month and year	No. of producing wells 9-30-41	Current daily average production	Cumulative production 8-31-41	Gravity of oil	Type of structure	Average zone thickness	Depth range
ALISO CANYON, LOS ANGELES:								
Porter (P)	10-38	13	2,185	1,444,552	22-26	Anticline	200-400	5,300-6,080
CAPITAN, SANTA BARBARA:								
Vaqueros (M)	10-30	51	2,315	5,389,416	18-22	Small anticline	100-125	1,300-1,450
Sespe (M)	1-31				38-42	Small anticline	375-450	2,300-3,200
DEL VALLE, LOS ANGELES:								
Modelo (M)	10-40	6	1,789	400,098	31-34	Faulted anticline	150-400	6,500-6,950
ELWOOD, SANTA BARBARA:								
Vaqueros (M)	7-28	75	3,124	67,937,900	32-38	Elongated dome	300-400	3,090-3,800
Sespe (M)	10-31				39-42	Elongated dome	175-225	3,625-4,400
GATO RIDGE, SANTA BARBARA:								
Tognazzini (M)	6-31	17	3,389	4,994,255	15-17	Anticline	700-900	2,475-3,270
NEWHALL-POTRERO, LOS ANGELES:								
San Francisco (M)	5-37	23	3,133	1,892,133	33-37	Anticline	300-500	6,400-6,950
OAK CANYON, LOS ANGELES:								
Upper Modelo (M)	2-41	3	250	21,395	21-23	Anticline	50-150	2,400-2,500
Lower Modelo (M)	7-41				31-34	Anticline	71	6,889-6,960
PADRE CANYON:								
Hobson (P)	2-36	15	965	1,399,424	29-32	Faulted anticline	50-150	5,450-5,800
RINCON, VENTURA:								
Hobson-Miley (P)	12-27	68	4,189	13,634,274	15-30	Fault. plunging anticl.	200-450	2,578-9,390
SAN MIGUELITO, VENTURA:								
Hobson (P)	9-31				25-31	Faulted anticline	150	7,825
Grubb One (P)	11-31	22	3,119	5,666,144	29-32	Faulted anticline	690-795	6,377-7,220
Grubb Two (P)	8-33				29-32	Faulted anticline	620-700	7,925
SANTA BARBARA, SANTA BARBARA:								
Mesa (M)	5-29	19	175	3,442,139	16-22	Faulted monocline	80	1,995-2,160
SANTA MARIA, SANTA BARBARA:								
Casmalia—all zones (M)	7-04				8-22	Anticline	400	635-2,800
Cat Canyon—East (P)	6-06				12-16	Plunging anticline	300	3,099-3,860
Cat Canyon—West (P-M)	Unknown	179	6,482	140,820,350	12-16	Plunging anticline	200-450	2,938-6,465
Lompoc—all zones (M)	2-03				18-22	Faulted anticline	300-700	1,900-3,300
Orcutt—all zones (M)	7-03				18-28	Faulted anticline	200-450	1,005-4,280
SANTA MARIA VALLEY, SANTA BARBARA:								
All zones (P-M)	7-34	169	18,912	19,908,888	14-17	Probable syncline	100-1,000	2,890-4,950
SUMMERLAND:								
All zones (M)	8-94	6	14	3,165,138	14-17	Faulted anticline	350	720- 900
VENTURA AVENUE, VENTURA:								
Gosnell-Lloyd (P)	9-16				26-31	Large anticline	500	2,600-3,300
Edison (P)	10-26	341	37,376	234,324,871	24-30	Large anticline	1,100	6,400-7,900
Fifty Seven (P)	4-31				27-33	Large anticline	500-750	8,250-9,900
Lloyd (P)	8-41				30	Large anticline	1,000	10,130-11,146
VENTURA-NEWHALL, VENTURA AND LOS ANGELES:								
Bardsdale (M)	1894				18-37	Anticline	100-1,000	500-1,750
Elsmere Canyon (M)	1889				14-24	Anticline	50-125	650- 900
Ex-Mission (P)	1875				24-28	Faulted monocline	25-130	1,000-3,550
Hopper Canyon (M)	1887				14-32	Compressed folds	100-250	500-3,240
Modelo (M)	1898				19-27	Compressed anticline	50-75	1,400-2,250
Newhall (M)	1889				14-20	Homocline and contact	25-100	820-2,040
Pico Canyon (P)	1875				32-40	Anticline	50-200	1,600-1,800
Rice Canyon (M)	1889				20-23	Compressed anticline	10-100	833-1,100
Sespe (M)	1887				24-27	Anticline and syncline	50-375	940-2,300
Shiells Canyon (M)	4-11				28-32	Anticline	150-350	1,500-3,300
Simi (M)	1912	511	4,280	63,550,774	21-32	Anticline	20-100	1,200-1,500
Sisar-Silverthread (P)	1885				11-25	Faulted monocline	20-70	494-1,250
South Mountain (M)	4-16				19-30	Elongated dome	50-350	1,945-4,500
Sulfur Mountain	11-27				16-20	Elongated dome	25-100	2,300-2,650
Tapo-Eureka (M)	1882				18-25	Anticline	50-100	690-1,250
Tenescal (M)	11-24				16-24	Anticline	250-600	2,200-3,100
Timber Canyon (P)	1898				25-35	Faulted monocline	50-150	1,200-4,200
Tiptop-Fresno Canyon (P)	5-18				25-28	Anticline and fault	20-50	1,450-1,600
Topa-Topa (M)	Unknown				35-37	Anticline	200	3,200-3,400
Torrey Canyon (M)	1896				27-33	Anticline	100	1,150-1,600
Wiley Canyon (M)	1887				25-32	Anticline	100	700-1,200
Lion Mountain (M)	5-35				19-21	Anticline	125	1,500-1,600
MISCELLANEOUS FIELDS:								
Edna, San Luis Obispo County (M)	1911				14-22	Anticline	50	1,115-1,250
Huasna, San Luis Obispo County (M)	7-28				8-12	Rising syncline	50	1,000-1,050
Half Moon Bay, San Mateo County (P)	1886	7	39	1,745,439	28-42	Overlap	25	1,150-1,250
Los Gatos, Santa Clara County (M)	Unknown				22-26	Monocline	25	1,150-1,250
Sargent, Santa Clara County (M)	Unknown				16-22	Anticline	40	1,400-1,550
Total coastal district		1,525	91,736	569,737,190				

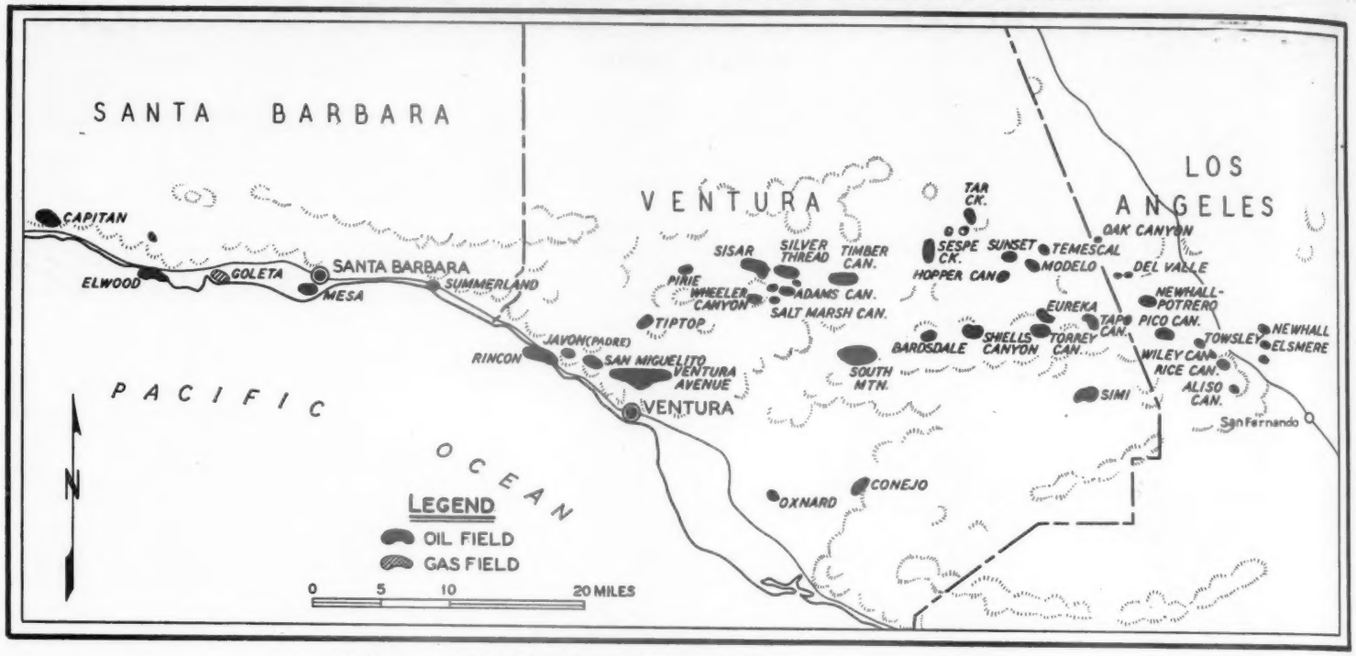
Note: Letters (C), (E), (M), and (P) following names of fields or producing zones designate age in this order: Cretaceous, Eocene, Miocene, and Pliocene.

LOS ANGELES BASIN DISTRICT

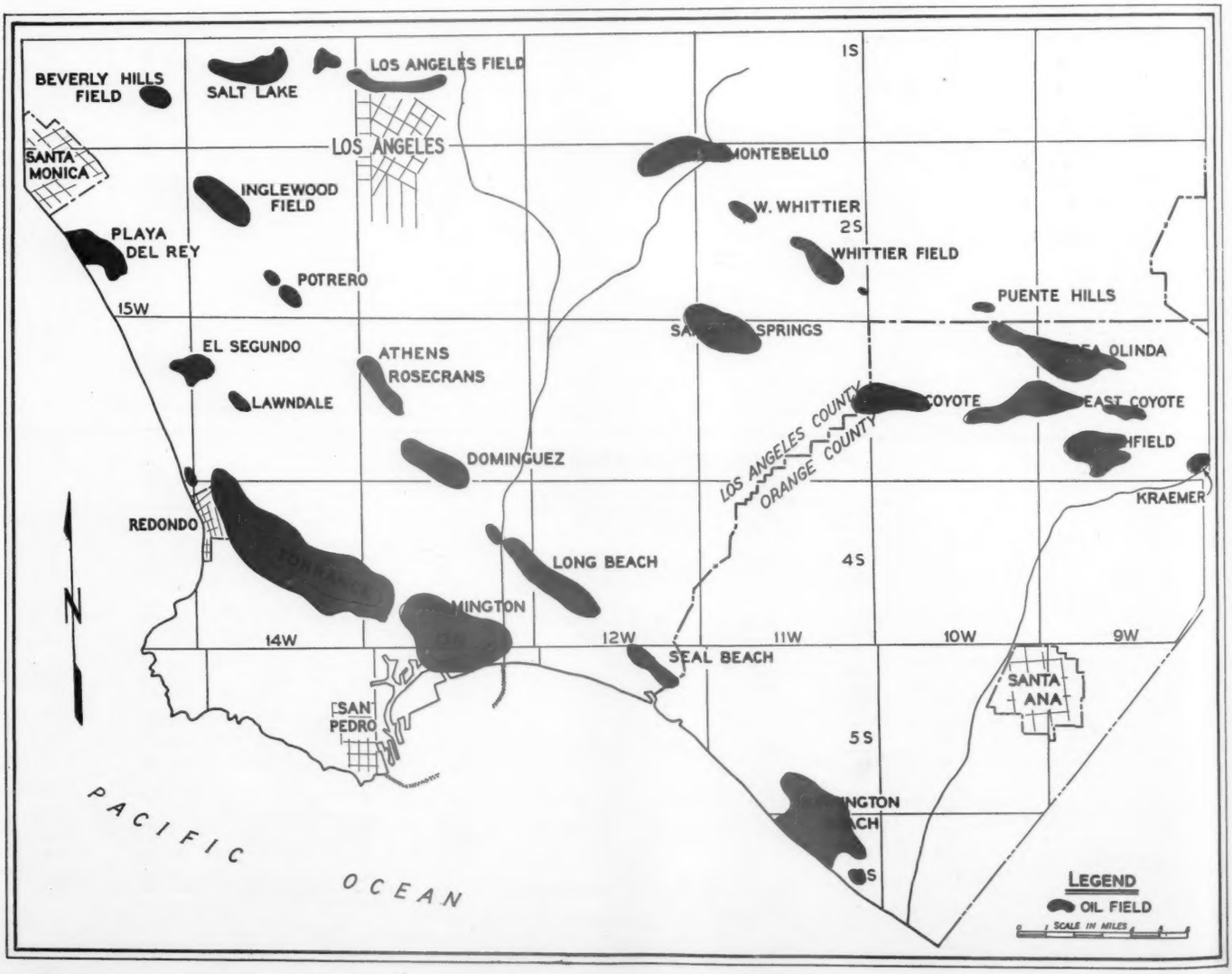
Field and county—	Discovery month and year	No. of producing wells 9-30-41	Current daily average production	Cumulative production 8-31-41	Gravity of oil	Type of structure	Average zone thickness	Depth range
BREA OLINDA, ORANGE:								
Puente (M)	1880				17-27	Faulted anticline	50-100	700-2,500
Brea (P)	1899	364	5,782	159,688,502	16-31	Anticline and fault	400-1,000	750-5,600
Olinda (P)	5-97				17-30	Faulted anticline	400-500	700-5,600
Tonner (P)	4-20				24-28	Anticline	400-450	700-4,100
COYOTE—EAST, ORANGE:								
Hualde (P)	3-11				13-26	Two elongated domes	300	2,530-3,850
Mathis (P)	8-27	87	3,799	43,061,302	18-25	Two elongated domes	400-600	3,900-5,050
Stern 1 (P)	8-29				22-25	Two elongated domes	200-400	4,000-5,250
Stern 2 (M)	7-40				24-28	Two elongated domes	400-1,100	6,000-7,500
COYOTE—WEST, LOS ANGELES AND ORANGE:								
Murphy (P)	4-09				17-33	Elongated dome	400-700	2,850-4,650
Ninety Nine (P)	3-24	76	7,380	125,440,190	25-33	Elongated dome	700-900	4,200-4,850
Emery-McNally (M)	3-30				25-33	Elongated dome	600-800	5,400-7,050
DOMINGUEZ, LOS ANGELES:								
First and second Callender (P)	9-23				22-25	Elongated dome	400-650	3,950-4,650
Third, fourth, fifth Callender (P)	11-24				24-32	Elongated dome	1,350	4,690-5,900
Sixth Callender (P)	5-34	243	23,034	127,494,308	25-33	Elongated dome	400-600	6,480-7,150
Seventh Callender (M)	9-35				28-31	Elongated dome	200	7,175-7,250
Eighth Callender (M)	6-36				28-32	Elongated dome	25-250	7,200-7,400
EL SEGUNDO:								
El Segundo (M)	8-35	36	1,406	9,968,388	22-27	Basement schist cont.	100-250	7,300-500
HUNTINGTON BEACH—NEW, ORANGE:								
Tar (P)	11-26				13-24	Faulted monocline	50	1,950-2,050
Jones (P)	7-26	262	18,265	86,000,260	22-24	Faulted monocline	100	2,590-3,100
Barley Flat (P)	12-21				22-24	Faulted monocline	100	4,200-4,300
Seventeenth Street town lot (P)	9-26				21-25	Faulted monocline	100-400	4,000-4,250
HUNTINGTON BEACH—OLD, ORANGE:								
Bolsa (P)	8-20				18-25	Faulted monocline	100-450	2,200-3,250
Ashton (P)	4-21	330	14,641	211,893,565	19-28	Faulted monocline	500-1,300	3,200-5,100
Surf (M)	9-22				20-30	Faulted monocline	.....	.....

(Continued on Page 44)

COASTAL DISTRICT—SOUTHERN PART



LOS ANGELES BASIN DISTRICT



COASTAL DISTRICT—NORTHERN PART

LOS ANGELES BASIN DISTRICT

(Continued from Page 41)

INGLEWOOD, LOS ANGELES:								
Vickers (P)	9-24				14-22	Elongated faulted dome	1,000	1,700-3,000
Rindge (P)	7-25				21-27	Elongated faulted dome	700	2,990-3,500
Rubel (P)	8-34	200	14,486	123,940,921	29-32	Elongated faulted dome	800	3,600-4,100
Moynier (P)	2-32				21-25	Elongated faulted dome	100	6,450
Sentous (M)	9-40				29-36	Elongated faulted dome	250-600	7,900-8,400
LAWNDALE, LOS ANGELES:								
Smith (M)	12-28	3	28	1,119,123	24-30	Sand lenses in shale	125-180	5,300-6,300
LONG BEACH, LOS ANGELES:								
Wilbur (P)	6-21				21-23	Anticline	200-250	2,385-2,500
Alamitos (P)	8-21				18-26	Anticline	650-725	2,650-2,900
Brown (P)	6-22	1,199	38,646	662,260,221	26-31	Anticline	650-2,000	3,622-5,000
Deep (P)	2-29				24-28	Anticline	1,500	5,100-8,400
Hilldon (M)	4-38				23-26	Anticline	250	7,400
De Soto (M)	12-38				27-30	Anticline	150-600	10,000-10,350
LOS ANGELES-SALT LAKE, LOS ANGELES:								
Beverly Hills (P)	7-09				15-19	Anticlinal dome	300-600	2,590-3,100
Los Angeles City (P)	1892	98	550	66,115,894	12-19	Anticline and monocline	75-300	900-1,200
Salt Lake (P)	1902				14-17	Anticl., syncl.-monocl.	200-500	1,900-3,000
MONTEBELLO:								
Baldwin 1 and 2 (P)	2-17				17-25	Anticline	1,000	2,150-4,400
Baldwin 3 (P)	12-24				18-26	Anticline	200	3,500-5,000
Nutt (P)	2-35				36-44	Anticline	100	5,585-6,550
Cruz (M)	9-33	342	12,301	125,960,524	35-38	Anticline	75	7,000-7,100
Sixth Zone (M)	12-37				28-40	Anticline	150	6,300-6,500
Seventh Zone (M)	11-39				35-39	Anticline	150	7,150-7,400
Eighth Zone (M)	4-39				33-37	Anticline	175	7,500-7,750
PLAYA DEL REY, LOS ANGELES:								
Recreation (M)	12-26				19-25	Elongated dome	200	5,200-6,700
Del Rey (P)	7-30	140	3,665	47,675,836	18-25	overlying schist	400-700	3,850-5,000
Del Rey Hills (M)	11-34				19-24	ridge	25-350	6,000-6,950
POTRERO, LOS ANGELES:								
All sands (P-M)	4-28	22	1,767	4,106,283	34-45	Badly faulted anticline	25-400	3,200-8,375
RICHFIELD, ORANGE:								
Chapman (P)	3-19				17-24	Several domes, syncl.	100-300	3,015-3,900
Kraemer (M)	6-20	306	6,465	94,546,913	17-31	Several domes, syncl.	300-600	3,500-4,800
Kraemer (P)	9-18				16-21	Asymetric anticline	200-700	2,275-2,750
ROSECRANS, LOS ANGELES:								
Athens—Upper (P)	2-25				28-32	3 small domes and fault	250-450	4,012-4,950
Athens—Lower (P)	5-24				30-40	3 small domes and fault	200-350	4,625-7,600
Maxwell (P)	8-24	177	8,449	47,297,880	30-39	3 small domes and fault	200-250	3,900-5,300
Zinns (P)	11-27				31-38	3 small domes and fault	100-150	5,800-6,800
O'Dea (M)	3-37				32-36	3 small domes and fault	100-250	7,500-8,000
SANTA FE SPRINGS, LOS ANGELES:								
Foix (P)	2-22				28-30	Elongated dome	75-100	3,475-3,800
Bell (P)	10-21				30-32	Elongated dome	200-350	3,650-4,000
Meyer (P)	10-19				32-36	Elongated dome	400-600	4,250-4,800
Nordstrom (P)	11-28	586	23,209	471,859,680	32-36	Elongated dome	400-500	4,650-5,450
Buckbee (P)	7-28				32-38	Elongated dome	300-350	5,650-6,290
O'Connell (P)	2-29				31-38	Elongated dome	300-450	6,240-7,300
Clark-Hathaway (P)	6-29				30-39	Elongated dome	600-750	7,070-8,200
SEAL BEACH, ORANGE:								
Alamitos Heights (P)	6-21				23-30	Dome against fault	250-1,000	4,650-7,150
Bixby (P)	8-26				22-25	Faulted elong. dome	100-200	4,400-4,600
Selover (P)	11-26	117	6,814	89,050,988	23-28	Faulted elong. dome	100-200	4,650-4,850
Wasem (P)	2-28				25-28	Faulted elong. dome	750-1,000	6,300-6,600
McGrath (M)	2-27				25-28	Faulted elong. dome	750-1,500	6,350-6,900
TORRANCE, LOS ANGELES:								
Del Amo (P)	6-22	618	8,490	103,679,469	14-19	Plung. faulted anticl.	150-400	3,025-4,000
D. & B. (P)	6-38				25-29	Plung. faulted anticl.	50-150	5,000-5,300
WHITTIER, LOS ANGELES:								
Bartolo (P)	7-35				25-28	Faulted monocline	30	3,114-3,170
Central (P)	1898	38	910	25,155,203	14-22	Faulted monocline	200	700-2,450
Rideout Heights (P)	1901				21-29	Faulted monocline	150-250	800-5,000
WILMINGTON, LOS ANGELES:								
Tar Zone (P)	11-36				12-15	Complex faulted anticl.	250-400	2,200-2,600
Ranger (P)	1-32				12-25	Complex faulted anticl.	400-600	2,350-3,000
Upper Terminal (M)	11-36	1,019	85,552	129,729,696	14-25	Complex faulted anticl.	400-500	2,850-3,400
Lower Terminal (M)	11-36				26-31	Complex faulted anticl.	500-700	3,400-4,400
Ford (M)	7-37				28-32	Complex faulted anticl.	750	4,850-6,800
Total Los Angeles Basin		6,263	285,639	2,756,045,146				
Total state		16,048	641,247	5,762,693,900				

Note: Letters (C), (E), (M), and (P) following names of fields or producing zones designate age in this order: Cretaceous, Eocene, Miocene, and Pliocene.

Ventura Avenue oil field, California, where Tide Water Associated Oil Co. has substantial production and extensive undeveloped leases

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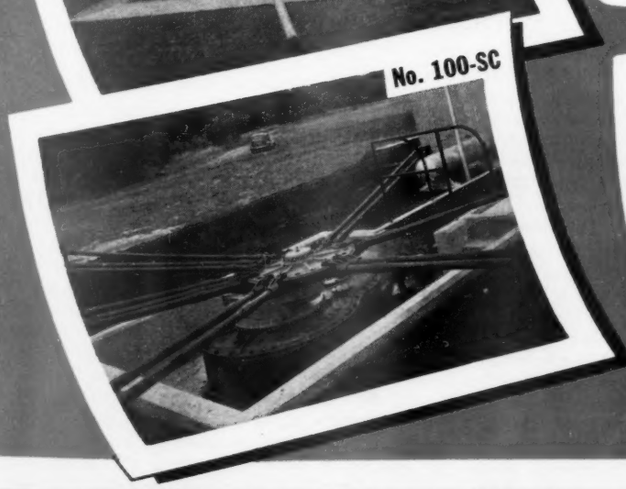

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Voluntary Crude-Oil Curtailment In California Effective

By A. H. BELL
General Superintendent, Continental Oil Co., and Chairman Conservation Committee of California Oil Producers

IN June 1939, almost exactly 10 years after the first organized attempt at voluntary conservation by the California oil industry, the present uniform proration formula first became effective. In May 1940 the then Central Committee of California Oil Producers was enlarged to its present membership. In July 1940 the present organization, with an administrator for the committee and the more descriptive name of "Conservation Committee of California Oil Producers," was chosen. These three steps capped the development, which has now extended over a period of 12 years, of a program unique in the oil industry of the world, and one which has spanned the most critical economic period in the industry's history. The program has been so successful that the California oil industry has come into the present days of emergency with more than adequate supplies of oil for the national defense, and in such healthy economic condition that it is fully able to fulfill its part of any program which the nation finds it necessary to adopt in the defense effort.

Throughout the period since the spring of 1929, when the late K. R. Kingsbury, then president of the Standard Oil Co. of California, headed a committee of operators who chose F. C. Van Deinse as the first oil umpire in California and thereby inaugurate the first attempt at organized conservation of oil in this state, constant progress has been made in organization procedure, in administrative procedure, and in the scientific construction of formulas and the determination of potentials by the voluntary conservation organization.

There has been a gradual establishment of precedent and public opinion to insure cooperation on the part of the 1,125 operators in the state who are today holding a potential production of 3,755,000 bbl. per day down to 642,500 bbl. per day of actual production as of September 1941. The conservation of oil is accomplished without benefit of enforcement laws. It is based on rules established in a truly democratic and formally legislative manner by duly elected representatives of oil-producing areas who are bound by majority decisions; it is only while the average producer has confidence in the equity of allotments recommended by the committee that such voluntary cooperative spirit as has been shown is possible.

Arriving at Allotments

The method of arriving at allotments for individual wells has developed from the early attempts to establish straight percentage cuts from well potentials to the present scientific method under the uniform formula. Development of more scientific methods itself has been stimulated by the necessity, in the absence of an enforcement law, to demonstrate the fairness and equity of the method in use, and to adopt changes and modifications as increased knowledge showed them to be advisable. The evolution of voluntary conservation in California during the past 12 years is a story of continual adoption of new methods; of education and of accomplishment of an objective through truly democratic means.

There had been some curtailment of individual fields to avoid unwieldly surpluses as early as 1922; the appointment of Mr. Van Deinse as umpire in 1929, however, marked the first organized effort by the California industry, but the program soon collapsed. It was followed in the fall of the same year by the establishment of two umpires' offices—one for Santa Fe Springs headed by H. P. Grimm, and one for Signal Hill headed by Neal H. Anderson—both of which became active on November 1, 1929.

The next step was the recognition of need for restricted production throughout the state—not at just a few fields. Then followed establishment of the "Central Committee for California Oil Curtailment" with Paul N. Boggs as chairman. This committee was composed of eight independent and seven major-company representatives and achieved a reduction of production by tabulating offers of cuts in output by operators in flush fields, computing field totals from these tabulations, and then computing company allotments on the basis of percentage reductions from potentials. No reductions were requested of settled fields.

Organizations Merge

Then followed the merging of the two umpires' organizations on July 28, 1931. Neal H. Anderson became umpire for the whole state and R. E. Allen, now director of production in the petroleum coordinator's office, became assistant umpire. A fact-finding committee headed by W. E. (Steve) Dunlap was appointed to determine potentials, which were used as a basis for determining allocations, and with which dissatisfaction was becoming widespread.

Soon the controversy over the so-called Sharkey oil-control bill arose, and the General Committee resigned after the bill was defeated by referendum. On May 19, 1932, the "Oil Producers Central Proration Committee" was organized with H. P. Grimm as chairman. This committee named three of its members to the "Executive Committee for Equitable Curtailment," of which William Keck, Sr., was head and which undertook to revitalize the conservation program. This committee appointed J. R. Pemberton as umpire after the resignation of Mr. Anderson, but soon became inactive, its functions being taken over by the Central Committee.

The Central Committee was reorganized in June 1933, when an election of field committees from 18 oil-producing districts was held, the chairman of the committees becoming members of the Central Proration Committee, of which Ralph B. Lloyd was elected chairman. This committee became the agency for the federal Government under the NRA and continued the general proration practices then prevailing. One modification in the method was made during this time: the recognition of a "market demand" factor, and at Kettleman Hills a modified bottom-hole-pressure method of allocation caused some confusion. The market-demand factor was brought in to modify a proposed uniform allocation formula which the committee found would otherwise seriously upset the supply of heavy oil as compared with light.

With the end of the NRA in May 1936, production control in California became demoralized, and in spite of strenuous efforts of various committees, production continued to climb until it reached 673,000 bbl. per day in January 1936. Then, Lawrence Vander Leck, who had succeeded Ralph B. Lloyd as chairman of the Central Committee, called the members together, and with the production level of December 1935 as a base, straight percentage cuts were used to arrive at a new allowable. This method of fixed allotment to pools was allowed until 1939 when the uniform formula was adopted, except that reallocation of decline in old fields to fields having new wells was made on a power-factor formula, and except that in certain fields allocations were based on a uniform method.

Gradually increasing dissatisfaction with the pegged-pool method led to the appointment of a fact-finding committee, headed by W. S. Rosecrans, and an emergency executive committee, headed by E. E. Pyles, in December 1938, who ultimately recommended that a uniform formula method of proration be adopted.

Following the recommendation of these two committees, the allocation committee, of which L. L. Aubert was chairman, was instructed by the Central Committee to work out such a formula, which was put into effect as of June 1, 1939, and still remains. Its principles are:

1. A minimum allotment, increasing with depth, for each well.

2. An additional allotment based on a graduated power-factor curve applied to the potential remaining after the minimum allotment is deducted and providing smaller percentages as potentials increase.

3. An arbitrary maximum, or top allotment, regardless of the calculated allotment arrived at through (1) and (2).

Committee Enlarged

In the May 1939 meeting, at which the committee was enlarged to include one representative from each of 29 producing districts, plus five members at large, Mr. Vander Leck was elected oil umpire as well as chairman. He resigned as of July 15, however, and the committee was again reorganized with L. P. St. Clair elected to the position of administrator for the committee, which changed its name to "Conservation Committee of California Oil Producers" and abolished the posts of umpire and assistant umpire. W. R. Wardner, Jr., who had been acting as assistant oil umpire since May 1937, was made assistant administrator. Present officers of the committee are: A. H. Bell, chairman; Lloyd Williamson, first vice chairman; Richard Fenton, second vice chairman; William L. Hobro, secretary. W. C. Whaley is chairman of the allocation committee, which is charged with the duty of determining method and amount of allocation each month and of methods of determining potentials, and F. M. Ziegler is chairman of the administrative committee, which is in charge of the fiscal affairs of the committee and of the administrator's office and staff. All committee decisions are subject to review by the Conservation Committee before becoming final. Rules provide for rotation on committees so that

(Continued on Page 94)

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Natural-Gas Reserves Equal to Total Production to Date

IN sharp contrast with crude-oil reserves in California, the available supply of natural gas for future production is equal to or slightly exceeds the total production of natural gas from oil fields and dry-gas fields to date. This is very important because it assures natural-gas distributors an adequate supply for a number of years to come, and especially in view of the fact that the state has produced a total of 7,837,582,539,000 cu. ft. of gas up to the present time. It is also interesting to note that gas waste during the first 6 months of 1941 is only 3.6 per cent of the total production during that period. This is the lowest percentage of gas waste recorded in California since natural gas was first put to commercial use. It is also interesting to note that the amount of natural gas wasted or unconserved has been progressively reduced for the past 10 years. This reflects curtailment of crude-oil production, regulation of dry-gas production and the fact that gas companies have nearly always laid transmission lines to new fields within a very short time after completion of the discovery well and are thus in a position to take deliveries of natural gas almost immediately and thus prevent the blowing of gas to the air.

As might be expected most of the natural gas produced to date in California has come from fields producing crude oil, and while Los Angeles Basin fields still top the production list, the San Joaquin Valley group will probably equal or surpass the former before the close of 1942. The highest periods of natural-gas production in Los Angeles Basin occurred in 1923, 1929 and 1930, which reflected simultaneous development of Long Beach, Santa Fe Springs and Huntington Beach during initial development of upper zones in 1922-23 and subsequent development of deeper zones in the same three fields during 1928-29-30. More than 50 per cent of the total production of natural gas from oil fields in Los Angeles Basin was produced in the 9-year period from 1923 to 1931, inclusive. During this time a total of 1,879,704,966,000 cu. ft. was produced. Production of the coastal district has been relatively stable during the past decade, but production of fields in the San Joaquin Valley area has been at the peak during the past 10 years.

Production of dry gas in California comes from a number of fields and zones but all dry-gas production does not originate in fields that produce dry gas exclusively. A number of oil fields contain zones that produce a dry gas exclusively and for this reason an accompanying list show-

CALIFORNIA NATURAL GAS UTILIZATION

(All data in thousands of cubic feet)

Year—	By gas companies*: Central and northern California	By gas companies*: Southern California†	By gas companies*: Subtotal	By oil companies	Total
1930	26,507,468	107,641,117	134,148,585	188,001,306	322,149,891
1931	52,083,555	106,469,578	158,553,133	158,338,654	316,891,787
1932	46,474,415	83,282,280	129,756,695	132,257,079	262,013,774
1933	51,643,562	92,085,170	143,728,732	115,632,263	259,360,995
1934	56,493,462	104,104,666	160,598,128	108,926,266	269,524,394
1935	63,537,829	110,453,608	173,991,437	122,054,026	296,045,463
1936	69,969,346	118,975,530	188,944,876	130,458,395	319,403,271
1937	76,726,384	123,714,721	200,441,105	135,359,523	335,800,628
1938	78,045,090	115,626,782	193,671,872	143,929,801	337,601,673
1939	94,598,185	124,573,252	219,171,437	123,373,823	342,545,260
1940	99,785,072	124,160,386	223,945,458	128,559,134	352,504,592
First 6 mo. 1941	53,262,969	68,642,240	121,905,209	63,553,399	185,458,608

*For resale and company use. (Excludes underground storage.)
†South of Fresno district and Paso Robles.

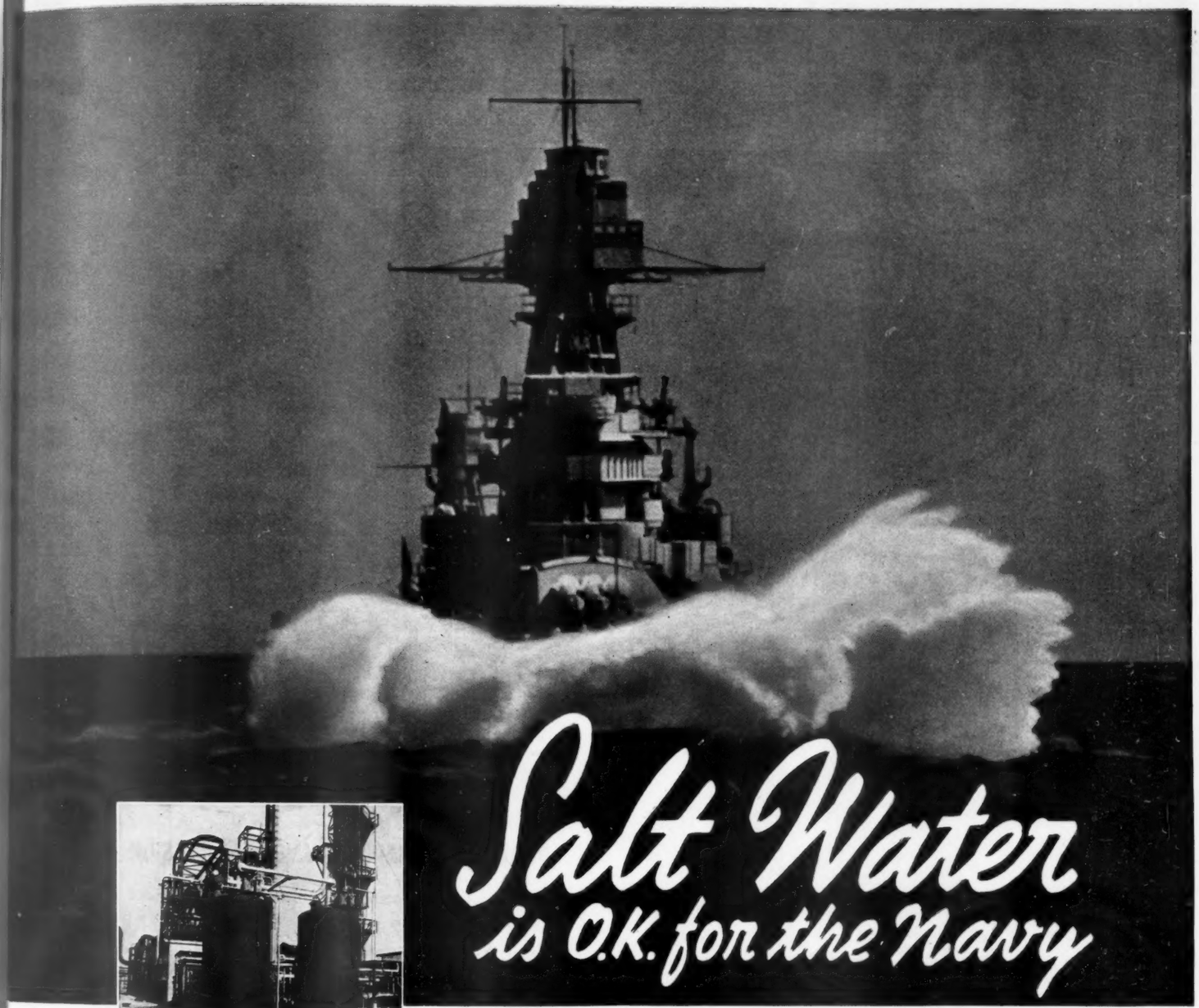
Year—	Total sales gas company	Percent of U. S. total	Standing in U. S.	Population served*	Total customers*	Standing in U. S.
1935	158,099,000	14.88	1st	5,356,200	1,486,640	1st
1936	174,020,900	14.33	2nd	5,363,300	1,547,310	1st
1937	184,214,935	14.10	2nd	5,364,100	1,582,670	1st
1938	177,932,036	14.88	2nd	5,833,500	1,639,042	1st
1939	202,674,836	15.30	2nd	6,249,200	1,714,248	1st
1940	207,189,025	....	2nd	.....	1,797,292	1st
First 6 mo. 1941	.....	....	....	.....	1,815,532	1st

*As of end of year.

CALIFORNIA NATURAL-GAS PRODUCTION AND UTILIZATION

Year—	Net production from formation (M.c.f.): Casing-head gas: L. A. Basin	Casing-head gas: Coastal	Casing-head gas: S.J.V.	Casing-head gas: Total C.H.	Dry gas	Total production	Total utilization*	Unconserved: M.c.f.	Unconserved: %	Crude oil production in barrels
Prior	26,842,000	24,326,000	14,144,000	65,312,000	.....	65,312,000	457,200	64,854,800	99.3	129,462,510
1906	6,410,000	7,840,000	6,215,000	20,465,000	.....	20,465,000	153,000	20,312,000	99.3	32,623,229
1907	8,500,000	13,100,000	6,970,000	28,570,000	.....	28,570,000	230,000	28,340,000	99.2	40,102,512
1908	10,850,000	13,850,000	9,220,000	33,920,000	.....	33,920,000	479,000	33,441,000	98.6	48,306,737
1909	11,850,000	12,820,000	14,620,000	39,290,000	1,305,000	40,595,000	2,324,000	38,271,000	94.3	58,191,723
1910	12,590,000	12,440,000	32,064,000	57,094,000	10,866,200	67,960,200	2,764,000	65,196,200	95.9	77,697,568
1911	14,060,000	12,260,000	40,155,000	66,475,000	7,035,359	73,510,359	6,390,000	67,120,359	91.3	83,744,044
1912	12,618,000	11,570,000	47,346,000	71,534,000	5,653,797	77,187,797	9,355,000	67,832,797	87.9	90,074,439
1913	15,466,000	10,360,000	56,225,000	82,051,000	6,754,850	88,805,850	11,035,000	77,770,850	87.6	97,867,184
1914	20,610,000	8,010,000	66,065,000	94,685,000	7,453,116	102,138,116	17,829,000	84,309,116	82.5	103,623,695
1915	17,395,000	8,340,000	52,540,000	78,275,000	4,925,662	83,200,662	21,891,000	61,309,662	73.7	89,725,776
1916	18,205,000	8,234,000	53,180,000	79,619,000	7,222,680	86,841,680	31,643,000	55,198,680	63.6	91,976,019
1917	23,824,000	10,761,000	53,295,000	87,880,000	10,910,890	98,790,890	49,427,000	49,363,890	50.0	97,781,574
1918	30,215,000	12,985,000	48,825,000	92,025,000	11,205,302	103,230,302	39,719,000	63,511,302	61.5	102,643,415
1919	31,783,000	11,927,000	46,260,000	89,970,000	26,024,988	115,994,988	55,607,000	60,387,988	52.1	101,907,729
1920	27,486,000	11,937,000	56,525,000	95,948,000	22,263,979	118,211,979	66,041,000	52,170,979	44.1	105,618,706
1921	37,060,000	11,550,000	68,462,000	117,072,000	13,011,307	130,083,307	75,942,000	54,141,307	41.6	114,566,901
1922	79,314,000	10,420,000	56,150,000	145,884,000	14,229,938	160,113,938	84,580,000	75,533,938	47.2	139,626,876
1923	267,360,878	10,215,939	44,628,639	322,205,456	11,670,988	333,876,444	131,434,000	202,442,444	60.6	263,728,895
1924	195,898,953	10,712,866	54,324,739	260,936,558	14,850,207	275,786,765	189,692,000	86,094,765	31.2	230,063,117
1925	144,936,871	23,826,679	51,694,672	220,458,222	5,197,777	225,655,999	187,789,000	37,866,999	16.8	230,147,342
1926	133,832,603	44,821,211	44,399,055	223,052,869	7,319,608	230,372,477	204,915,000	25,457,477	11.1	224,117,013
1927	149,307,963	75,227,557	37,666,607	262,202,127	4,566,263	266,768,390	212,897,000	53,871,390	20.2	230,751,463
1928	193,051,160	79,808,905	39,294,757	312,154,822	2,435,219	314,590,041	251,252,929	63,337,112	20.1	231,982,597
1929	380,277,428	101,542,752	80,130,551	561,950,731	2,323,265	564,273,996	355,531,160	208,742,836	37.0	292,036,911
1930	270,688,764	80,349,480	196,947,582	547,985,826	6,131,075	554,116,901	322,149,891	231,967,010	41.9	228,099,899
1931	144,350,346	72,550,562	170,592,318	387,493,226	1,766,587	389,259,813	316,891,787	72,368,026	18.6	188,829,032
1932	98,553,027	49,931,602	131,833,952	280,318,581	1,757,520	282,076,101	262,013,774	20,062,327	7.1	178,127,794
1933	89,417,740	46,066,840	135,894,183	271,378,763	2,475,582	273,854,345	259,360,995	14,493,350	5.3	173,083,319
1934	90,078,148	46,054,542	147,002,539	283,135,229	4,964,075	288,099,304	269,524,394	18,574,910	6.4	175,508,566
1935	96,193,181	45,117,467	165,974,310	307,284,958	11,830,174	319,115,132	296,045,463	23,069,669	7.2	207,832,131
1936	95,849,089	50,408,972	192,078,626	338,336,687	5,527,608	343,864,295	319,403,271	24,461,024	7.1	214,773,315
1937	97,599,617	53,613,727	191,928,390	343,141,734	11,622,318	354,764,052	335,800,628	18,963,424	5.3	238,520,383
1938	115,687,077	50,565,405	195,790,741	362,043,223	13,792,266	375,835,489	337,601,673	38,233,816	10.2	248,749,246
1939	126,157,742	48,954,780	173,608,712	348,721,234	27,129,392	375,850,626	342,545,260	33,305,366	8.9	224,354,048
1940	132,370,220	45,132,264	179,402,753	356,905,237	25,184,681	382,089,918	352,504,592	29,585,326	7.7	223,881,712
1st 6 mos. 1941	24,326,510	59,857,526	92,600,067	176,785,103	15,615,280	192,400,383	185,458,608	6,941,775	3.6	111,850,338
Grand total	3,251,016,317	1,207,489,076	3,054,054,193	7,512,599,586	325,022,953	7,837,582,539	5,608,677,625	2,228,904,914	28.4	5,722,977,758

Source of data: Gas production and utilization figures 1906-29, incl., from Southern California Gas Co., department of petroleum engineering.
Gas production and utilization figures 1930-41, incl., from state Department of Natural Resources, Division of Oil and Gas, and Pacific Coast Gas Association.
All dry-gas data from Southern California Gas Co., department of petroleum engineering. Crude-oil production from American Petroleum Institute.
*Includes all gas stored underground.



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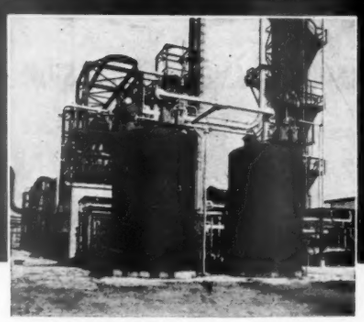

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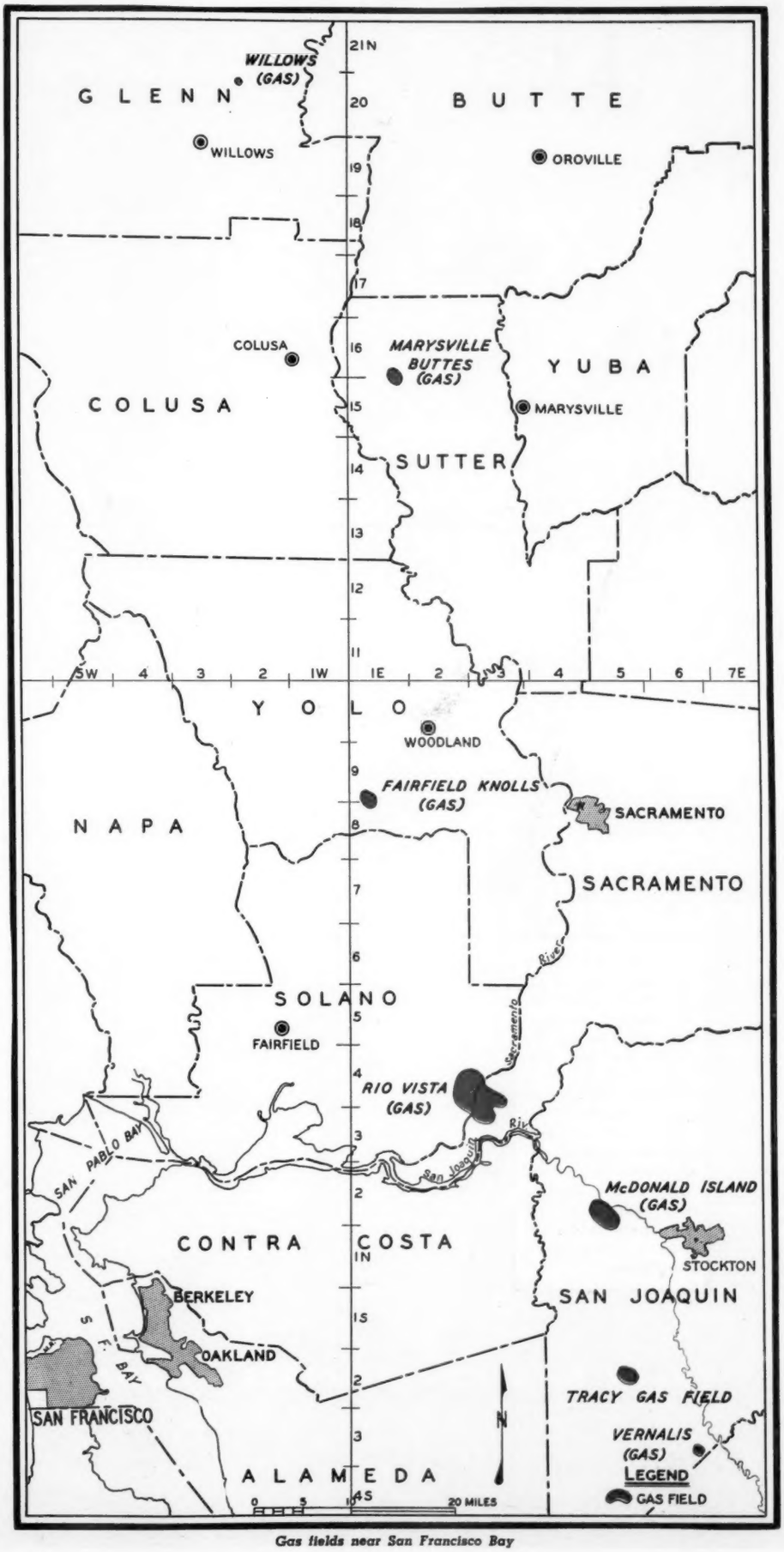
ing dry-gas production will contain several oil fields. This is particularly true of Buena Vista Hills, Dominguez, Elk Hills, El Segundo, Long Beach, McKittrick, Midway-Sunset, Rosecrans, Santa Fe Springs, Seal Beach and Whittier. A number of dry-gas fields have been discovered and developed during the past 10 years but none of them has been on steady production for any great length of time. Restricted deliveries are being taken from Marysville Buttes, Rio Vista and McDonald Island currently and if at any time a sudden demand arises for additional gas some of the other dry-gas fields are opened up sufficiently to make up the shortage. This operating status has resulted in several gas fields producing for a period of about 3 months during the winter season when demand is highest. Due to the large production of casinghead gas from oil fields there has been very little occasion for gas fields to go on sustained production. California gas fields which produce dry gas exclusively and productive acreage are:

Buena Vista Lake	750
Buttonwillow	1,750
Delano (Trico)	650
Fairfield Knolls	160
Goleta	200
Marysville Buttes	1,000
McDonald Island	640
Rio Vista	8,000
Semi-Tropic	1,000
Tracy	500
Vernalis	200
Willows	240

The acreage and areal extent of gas fields changes quite frequently as the productive acreage is vitally affected by edgewater encroachment. When a gas well goes to water there is nothing that can be done except abandon the hole. Due to drilling costs and the probable production of dry gas per acre it has been found advisable to use wide spacing of wells. This spacing may range from one well to 100 acres to one well to several hundred acres depending, among other factors, upon how much of a zone is available and the shape of leases. Rio Vista is by far the largest and most productive dry-gas field in the state and consequently has the largest dry-gas reserve. Gas fields found in the central part of the state adjacent to the San Francisco Bay region and to the north produce from the Cretaceous. Gas fields in the San Joaquin basin produce, as a rule, from Upper Pliocene sediments. In the San Joaquin Valley the productive measures are designated as the Mya zones and in the northern area the productive zone is the Emigh.

The calorific value of dry gas found in existing gas fields is quite favorable and ranges from 930 B.t.u. at Chowchilla to a high of 1,040 B.t.u. at Rio Vista. A British termal unit (B.t.u.) is the unit of heat required to raise the temperature of 1 lb. of water 1° F. at or near its point of maximum density. Rio Vista, by the way, has two productive zones and an average porosity of 35 per cent which indicates the large gas reserve in this field. There is every reason to believe that additional gas fields will be found in the central part of the state as the Sacramento and other adjacent sections contain enormous thicknesses of Cretaceous rocks. Due to the fact there is only a market for a small amount of natural gas from dry-gas fields, gas production is allocated, as far as possible, proportionately to properties on an acreage basis within productive limits that are changed from time to time by agreement among operators involved. Because experience has shown that a production rate of less than 1,000,000 cu. ft. per day is difficult to regulate it has become common practice in some fields to produce the total allowable for each month during the first week or 10 days and then shut in wells during the remainder of the month. Although almost all gas wells are tubed, it is common practice to produce

(Continued on Page 110)



Gas fields near San Francisco Bay

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The Reed Kor-King (for conventional coring) is simple in construction with non-rotating inner barrel and core catcher. The inner barrel operates against oil proof, slush lubricated rubber bearings, an exclusive Reed Kor-King feature. Choice of Inside Vent Type, Outside Vent Type, or Drop Ball Type may be had in the same barrel with a few minor changes.
W-I-B DRILLING BITS • DRILL COLLARS • REAMERS • VALVES

The history of California's petroleum industry is a saga of individual accomplishment. Most of the companies whose names are now written in bold letters on the Pacific Coast had inauspicious starts in the older fields of California.

Individual effort, determination, perseverance and foresight were the pioneering qualities that enabled most of the members of the virile California petroleum industry to build on foundations that have proven durable through the ensuing 75 years.

New companies have come into the picture at various stages of development but they too have based their policies on the same basic principles as the earlier pioneers and now occupy positions relative to the scope of their operations and their particular phase of operations.

The following histories of several of the individual companies and reviews of their current activities attest to the soundness of the fundamental substructure of the Pacific Coast's petroleum industry.

Standard Oil of California

First in Many Operations

ECONOMIC growth of the West has been closely related to the development of Standard Oil Co. of California. The history of the company, its forerunners, and its founders, is the history of the California oil industry. Accomplishments of the company include California's first commercial oil well, the first successful refinery in the West, the first tanker on the Pacific, and the first service station in the world.

Oddly enough, the company was founded to supply a need that has since ceased to exist—the need for lamp fuel. To retain leadership for 66 years while the character of its business changed from the sale of light to the supplying of power (together with byproducts for every phase of modern life) required "economies of efficient organization, hard work, experience, and years of loyal faithful service on the part of employes," as it was expressed by the founder, D. G. Scofield.

The word "research" should be added to Mr. Scofield's list of factors responsible for the company's success, as the accomplishments of Standard of California in the field of research are many. It was research that enabled the company in its early days to manufacture a nonsmoking kerosene from the heavy crude available; and it was research that last year made possible the application of the Houdry refining process to California crude, thereby augmenting the supply of high octane aviation gasoline for the nation's defense.

Origin of the Company

When D. G. Scofield, a 27-year-old prospector from the Pennsylvania oil fields, came to California in 1870, a growing West Coast civilization was dependent for light upon 60-cent-per-gallon kerosene which had to be brought around the Horn on a 14,000-mile voyage in sailing ships. Mr. Scofield, who soon began prospecting, saw oil possibilities in the Ventura-Newhall area. In San Francisco he obtained the necessary financial backing, and with a Los Angeles carpenter he built his rig in Pico Canyon. The primitive Chinese spring-pole method of drilling was used, whereby two men acted as prime movers for actuating a percussion-type bit.

After a month of dreary labor, the well came in to produce 2 bbl. of 32°-gravity oil per day from a depth of 30 ft. The second hole was drilled with like results, the third was a dry hole, but the fourth was a real success, yielding 150 bbl. per day from a depth of 600 ft.

It was 1875 when the big well came in, and California's oil industry dates back to that day. There had been a considerable number of drilling ventures between 1864 and 1866, and some of these tests had found oil, but never before had commercial production proved feasible.

To handle the new production, the California Star Oil Works Co. was formed with Mr. Scofield as general manager. First activity was to erect the West's first commercial refinery near the site where the town of Newhall has since developed. This was followed by a second refinery at Ventura, which was then known as San Buenaventura.

Financial difficulties arose from having to transport the crude and refined products by wagon over the mountainous country, and Mr. Scofield saw that survival of the enterprise necessitated the facilities of a larger company. The young company then gave way to Pacific Coast Oil Co. The new company, organized in 1879, immediately built California's first pipe line, a 2-in. artery which ran from new wells in Wiley Canyon to a station on the newly completed Southern Pacific coast route. Tank-car service was inaugurated to a new refinery which the company built at Alameda Point on San Francisco Bay.

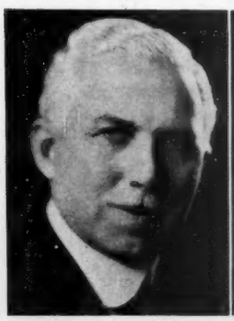
Integral Concern Formed

From 1879 to 1884 Pacific Coast Oil Co. and the California oil industry were one and the same thing. But in 1884 Standard Oil Co., Iowa, opened a small office in San Francisco and began aggressively to market petroleum products to a population that had doubled in little more than 10 years. As competitors, the two companies distributed kerosene, harness oil, axle grease, coach oil, and sewing-machine oil along the entire West Coast. In 1887, Pacific Coast Oil Co. started the experimental work which was to lead to the use of petroleum as fuel for ocean-going steamers. Railroads of the west were also soon converted to the use of petroleum fuel.

In spite of railroad tank cars, transportation had continued to be a problem to Pacific Coast Oil Co. with its heavy production. The solution was found in 1888 when the company launched the George Loomis, a tanker named in honor of the concern's president. This was the second steam-driven tanker to be built in the United States, and the first to operate on the Pacific.

At the beginning of the nineties, Pacific Coast Oil Co. occupied a position of unchallenged strength in production, transportation, and refining, while Standard Oil Co. held a similar West Coast position in the marketing field. The inevitable result was that Standard Oil Co. contracted to sell all products of the producing and refining concern.

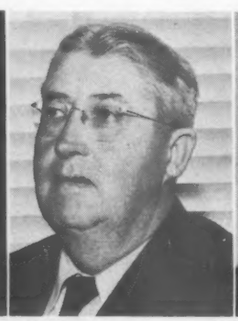
At the turn of the century, after both companies had grown under their agreement, Standard bought out Pacific Coast Oil Co. through stock purchase, but the name was retained until the San Francisco earthquake. After the famous dis-



H. D. COLLIER
President, Standard Oil Co. of California

P. H. PATCHIN
Director, Standard Oil Co. of California

CHARLES S. JONES
President Richfield Oil Corp.



GEORGE L. MACHRIS
President Wilshire Oil Co., Inc.

MAURICE A. MACHRIS
Vice President Wilshire Oil Co., Inc.

S. GUY LINTON
Secretary-treasurer Wilshire Oil Co., Inc.

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And still going Strong!

The tool joint illustrated above is one of twenty-five resleeved shrink-grip joints hardfaced with Electric Tube Borium. The deposit was applied to a recess 1/8" deep and 1 1/2" to 2" wide. Each hardfaced joint was spaced by ten unfaced joints and position was changed up or down the string during the run. After 18,000 feet of drilling, the unfaced joints were 5/8" to 7/8" undersize on O.D. ... the hardfaced joints showed NO WEAR! Only 127 unprotected joints out of the original 275 were fit for further service. Moreover, nearly every unprotected joint was worn egg-shaped, while all hardfaced joints were perfectly concentric. Present savings are estimated at $20.00 per joint, and may amount to three times that when the run is completed.

* * * * *

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STOODY COMPANY *Hard Facing Alloys*

This modern station is symbolic of Standard Oil Co. of California progress

solution decree in 1911, Standard Oil Co. (California) emerged, and D. G. Scofield, who had founded its predecessor, became first president of the new company. It was not until 1926 that the company adopted its present name.

The Gasoline Age

The July 1904 issue of The Oil Investors Journal (now The Oil and Gas Journal) carried its first advertisement of an automobile, a 4-hp. vehicle offered for $425. Three years later, Standard had an improved model of the vehicle in use on its California pipe lines, thereby being the first oil company to find a place in its business for an automobile.

Gasoline at this time was a nuisance which had to be distilled off to make kerosene safe for its users. Since completion of Standard's Richmond refinery in 1902, now one of the world's largest refineries, gasoline had been especially plentiful. It was this apparently inexhaustible supply of cheap fuel that gave the automobile its immediate acceptance in California. The ability of Standard Oil Co. of California and other companies to keep ahead of the rapidly increasing demand for gasoline that followed has placed California second among the states in automobile ownership and has made possible its complete highway system.

When the automobile first made its appearance on the Pacific Coast in 1905, oil dealers filled tanks from 5-gal. cans. This servicing method was used exclusively until 1907 when Henry Harris, Standard's employe, built the world's first service station at the gates of the Seattle sales terminal. Efforts of Standard Oil Co. of California in the field of motorist service have never been slackened since that day, illustrated by their original introduction of the customer credit-card system in recent years.

Typical of the results that have been realized from Standard of California's research is the development of a process for rearranging the molecules in certain petroleum derivatives to give a cresylic acid with 15 to 20 times the germ-killing power of carbolic acid. Cresylic acid was formerly obtained largely from coal tars in the eastern states. Its derivation from California crude makes it cheaper and more readily available in the West where it is used extensively as the "frother" in the flotation process for concentrating metalliferous ores, and also in the manufacture of commercial disinfectants.

The research laboratories, recently constructed at Richmond, house only a part of the technical activities constantly in progress. Investigations are carried on in field and refinery, and a flying laboratory has been used extensively in order to develop better aviation fuels.

The extent to which information acquired through research is utilized can be indicated by an example. Having been first to adapt the Houdry process to the refining of California crudes, a $4,500,000 plant to carry out the process is now under construction at the El Segundo refinery.

The Directorate

In many respects Standard of California's policies are unique. During 14 years of broadcasting the Standard Symphony Hour, no commercial intrusion has been made on the listeners. Almost as unusual is the fact that all directors of the company are full-time employes. Being executives of the various departments, each director brings to the board meeting intimate knowledge gained from years of service. An example is H. D. Collier, who was elected president in July 1940. At the time Mr. Collier was made a director (1924), he had already served the company 21 years.

•

Machris Family Guiding Spirit in Wilshire Firm

HISTORY of the Wilshire Oil Co., Inc., is the personal saga of the Machris family — a closely-knit unit which got into the oil business by accident and achieved its success by the rough-and-tumble route. From the very inception, back in 1914, when Vic, George, and Al opened their first gasoline station at the corner of Main and Moneta, credit for the growth and expansion of the Wilshire company has been due in a large part to the brains and brawn and sweat of a Machris.

Today a new Machris is coming to the fore, a young fellow who has undertaken the herculean job of carrying on the family traditions for hard-hitting, dynamic principles.

Maurice Machris is the only male member of the second Machris generation. He was born in Los Angeles in 1905, the son of Al Machris. And, while he was still in short pants, it was a foregone conclusion that his narrow shoulders would some day have to assume the burden of carrying on the name and fame of Machris. No young sprout ever had a tougher job cut out for him. To live up to the family specifications, he had to have the imagination and promotional instinct of Uncle Vic, the financial and marketing acumen of Uncle George and the rugged qualities which made his dad, Al, a leader among the men in the field.

Maurice A. Machris, better known as Maurie, began earning a day's pay from the Wilshire Oil Co. at an early age. When only 13 years old, Maurie took on the job of acting as water boy at the Fellows plant. No romance to this task of lugging water to thirsty throats. It was really a man's work and Maurice held this menial position during summer vacations while still in grammar school.

Learned Business From Dad

In between schooling, young Machris was given the "works" by his dad and uncles. One job led to another until, in 1925, he had been promoted to the position of trap drainer at the Wilshire gasoline plant at Santa Fe Springs. Anyone visiting the plant would never have recognized Wilshire's future vice president under the grime, muck and grease which covered his face and clothes. In 1929 he enrolled at the University of Southern California to take a series of specialized courses on petroleum engineering.

Immediately after the completion of his studies young Maurice began to receive a little recognition from his father. Al Machris at that time was in charge of all Wilshire field operations, and it was natural that he assigned his son to the land and geological department.

Then followed 5 years of field work. Maurice learned the drilling end of the business from the core up. He suffered the disappointments that come with a dry hole and enjoyed the thrill of seeing a big producer completed.

In 1936 Maurice Machris got his first big break with the Wilshire company—exactly 23 years after he started as a water boy. The company had just completed one of the largest and most modern refining plants on the West Coast. Someone had to be responsible for the operation of the $5,000,000 refinery, and Maurice Machris was appointed manager of refining operations. It was a big job but past training came to the surface and Maurice distinguished himself in carrying out this assignment. Shortly thereafter, due to the illness of his father, he was given the additional responsibility of the company's field operations.

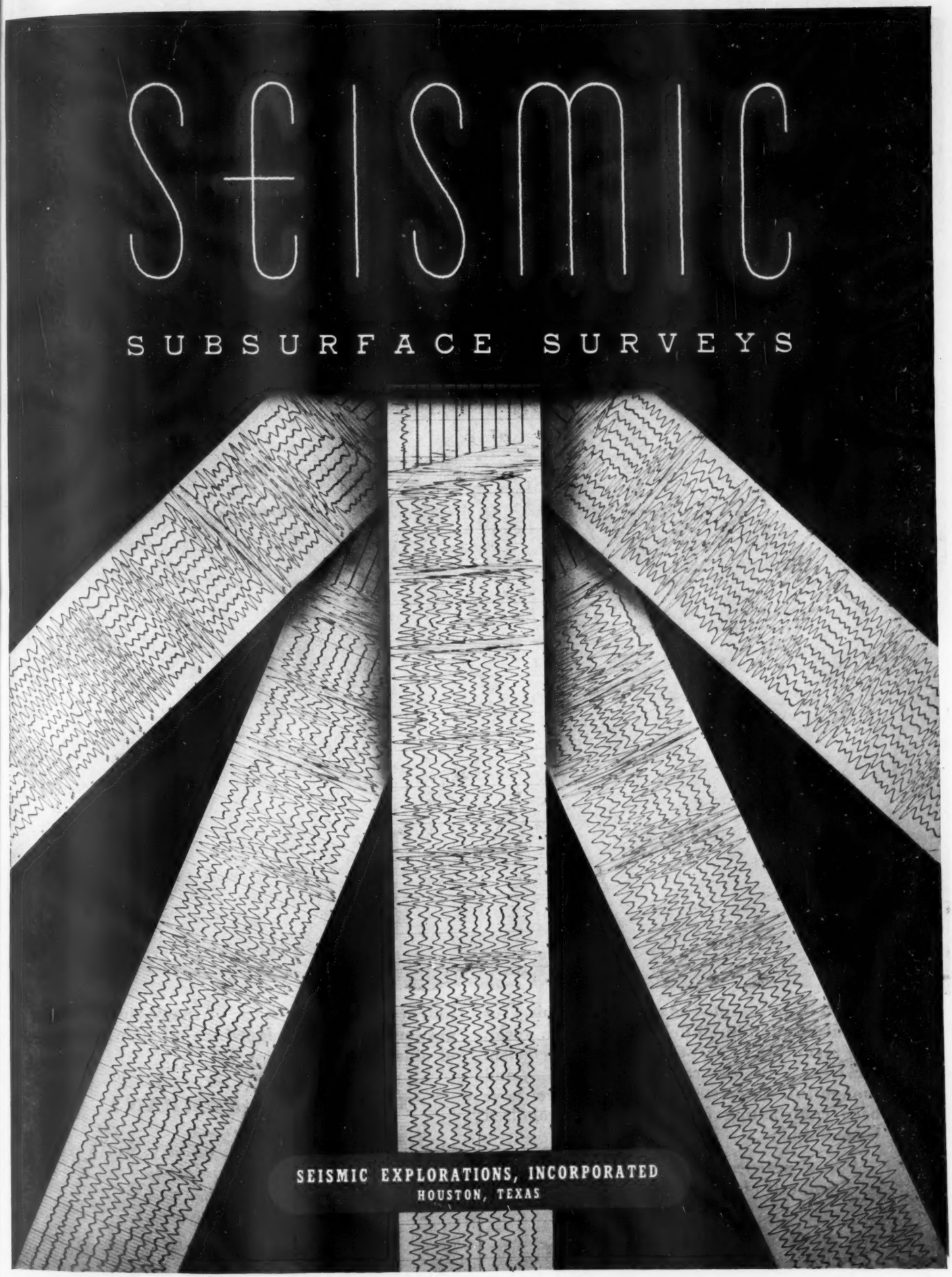
Shoulders New Responsibilities

In 1938 the oil industry was shocked by the passing of Al Machris, the second of the original three Machris brothers to die in the saddle (Vic Machris passed away in 1930). After the death of his father, Maurice was appointed vice president of the company in September 1938.

Today Maurice Machris is respected for his constructive views and admired for his directness in approaching any given problem. Maurice has definite ideas and is seldom reticent in expressing them.

Although a hard and conscientious worker, he can always find time for a hunting or fishing trip—a pastime in which he excels. He has a very charming wife, who before her marriage was Paquita Lick, a member of a pioneer Los Angeles family.

Maurice Machris achieved success the hard way and maybe that is why the importance of his position is never evident to employe, friend, or stranger.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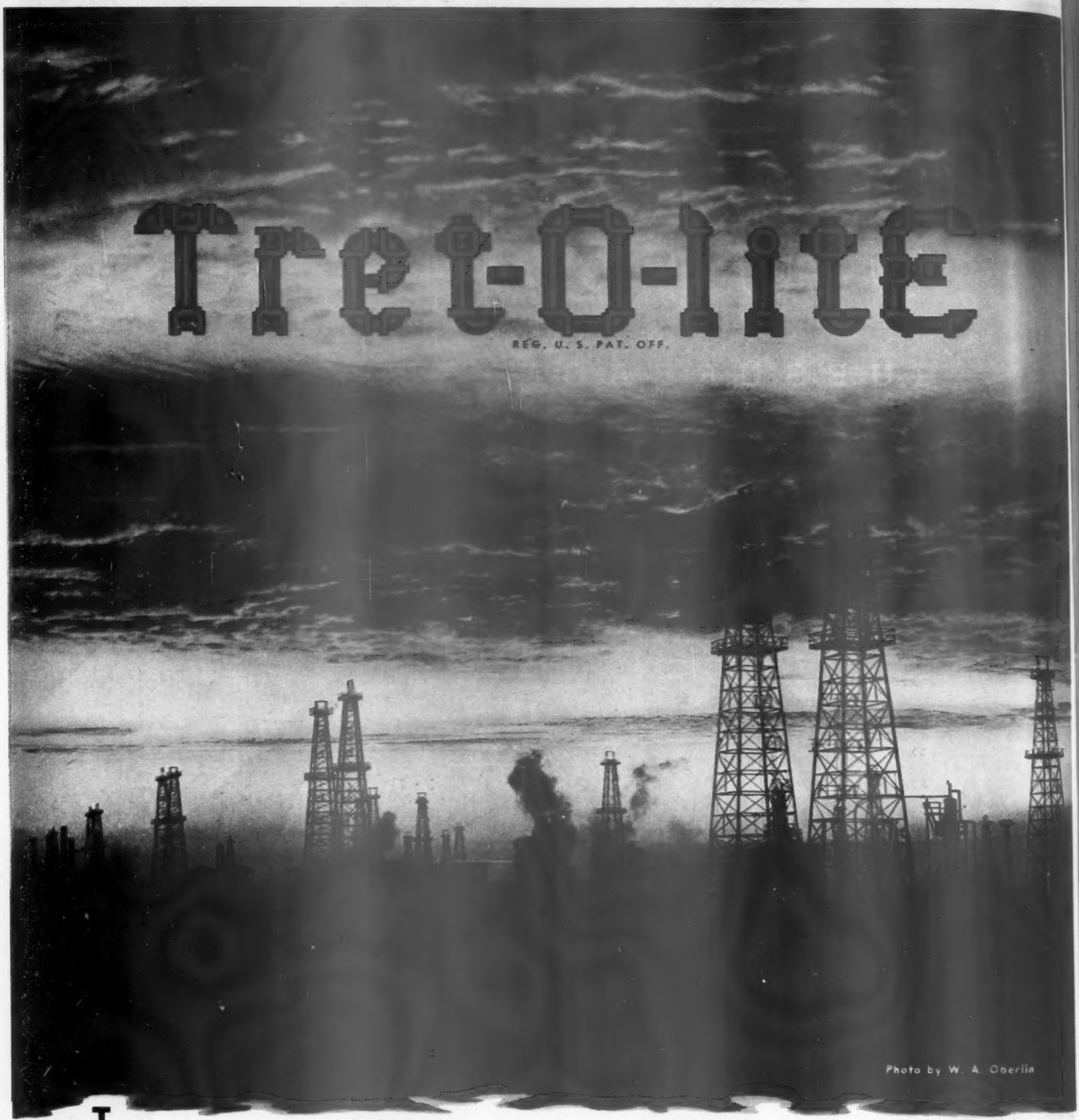

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General Petroleum's Rise Achieved in Few Years

GENERAL PETROLEUM CORP. OF CALIFORNIA, in a comparatively few years, has become one of the leading producers, refiners, and marketers of petroleum products on the Pacific Coast, having kept pace with the growth of the industry. Although it did not enter the retail field until late in 1923, the company has made rapid strides to the point where the retail outlets handling its products are now numbered in the thousands.

All departments of the corporation have likewise matched this progress to round out a well-balanced production, refining, and marketing organization.

In the light of current discussion on pipe lines and their place in the defense program, it is interesting to look back to the construction of the first line from the Midway field in the San Joaquin Valley, south through the Tehachapi Mountains over the 4,200-ft. Tejon Pass, to the breakwater at San Pedro.

Capt. John Barneson, founder and for many years president of the company, was a man of vision, one who enjoyed tackling any problem which those of lesser courage labeled as "impossible." So it was with the Midway-San Pedro pipeline project. The "experts" actually jeered at John Barneson and went so far as to call the project "Barneson's folly." Many of those who doubted were seasoned oil men whose opinions were respected. Knowing Mr. Barneson's capacity for accomplishing the impossible, the "doubters" left themselves a loophole by saying that the pipe line might some day be built but that oil would positively never flow through the system he proposed. Oil, they said, was too heavy to be pumped up the steep grades.

Undaunted, Mr. Barneson and his associates went ahead with the job, even though it was admittedly a hazardous and expensive undertaking. In May 1913, the job was completed, the pipe line reaching 155 miles from the floor of the San Joaquin Valley, over the almost insurmountable Tejon Pass and through Los Angeles to the extreme tip of the San Pedro breakwater, a mile out to sea. Thus, another "impossible" job had been completed.

Among other phases of the industry in which the company has pioneered was the manufacturing of toluene from California crude during World War I. This activity was reported in the August 21, 1941, issue of The Oil and Gas Journal. S. J. Dickey, now president of the company, supervised the work.

General Petroleum also has always helped to pioneer the design, development, and use of modern pumping equipment in California and the design adopted in 1927 has required only minor revisions to keep abreast of the best equipment available to date. Among the features incorporated in that design were simplicity and low initial cost, high-operating efficiency, adequate stroke length to permit pump and rod economy, and sufficient reduction ratio to permit economic pumping speeds in the later life of the well with inexpensive sheave changes.

Use of dynamometers and related equipment for determining the operating characteristics of pumping equipment is another work pioneered by the company. General Petroleum has maintained an aggressive policy of making complete mechanical tests for pumping wells as frequently as is necessary to assure optimum operating conditions. Also, the company was among the first in California to make comprehensive use of bottom-hole pressure gages, and has consistently maintained an aggressive but conservative policy of doing survey work to the extent that is justified by results.

Recently, the company has established its own core-analysis laboratory. A systematic policy has been adopted of analyzing its own cores as well as occasionally analyzing those from wells of other companies for the mutual benefit of all concerned.

The corporation has been an active supporter of A.P.I. activities ever since its organization. This is evidenced by the number of General Petroleum men who have been active on numerous A.P.I. committees. A partial list of members and the committees on which they have served is as follows:

S. J. Dickey: President and director of General Petroleum. Active in early A.P.I. standardization work; secretary—Wire Line Committee; national chairman—Field Boiler Committee; active on fire prevention and measuring, sampling, and testing of crude oil committees.

B. E. Parsons: Vice president, director, and manager of production department. He is a member of general committee—Division of Production.

E. L. Adams: Vice president, director, and manager of pipe-line department. He is national chairman—Regional Subcommittee on Pipe Lines; chairman—California District Committee of Regional Subcommittee on Pipe Lines; member—Central Committee on District Activities; Correlating Committee on Standard Procedure for Measuring, Sampling, and Testing of Crude Oil; Central Committee on Pipe-Line Transportation; Advisory Committee on A.S.A. Code for Pressure Piping; Topical Committee on Pipe-Line Technology.

W. Cunningham: Treasurer, comptroller, and director. Member—Committee on Uniform Methods of Oil Accounting; chairman—Regional Subcommittee No. 5 of this general committee.

A. O. Woll: Director and manager of marine department. He is a member of the Central Committee for Tanker and Barge Transportation.

Among others who have served on various committees are: C. E. Ziegler, J. T. Durkee, G. F. Olsen, T. C. Smith, B. A. Moeller, R. B. Bryant, H. A. Mason, J. D. Tobey, J. M. Grandy, and A. L. Knipping, Jr.

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Refiners Marketing Company Is Large Wax and Lube Outlet

THE largest wholesaler of lubricating oils and waxes in the Pacific Coast territory is Refiners Marketing Co., Ltd., an organization that was founded about 10 years ago by William H. Henszey, its present president. This company represents a number of the largest eastern and Mid-Continent refiners for the sale of their unbranded products on the Pacific Coast, buying and shipping in chartered tankers and tank cars either direct to customers or into its own storage facilities at Oakland, San Francisco or Los Angeles harbor. Between 1,500,000 and 2,000,000 gal. of finished lubricants are maintained in stock at all times. Refiners Marketing Co. numbers among its customers many large oil marketers who take delivery into their own pipe lines or tank cars. The company also blends to specified S.A.E. grades and supplies lubricating oil in cans to many of the smaller independent marketers. Mr. Henszey was for many years associated with the Union Petroleum Co. and served in the United States Navy during the first World War, later becoming lieutenant commander of the U. S. Naval Reserve. E. W. Hutton, vice president, became connected with Refiners Marketing Co. 5 years ago following 14 years service with Union Oil Co. of California, where he was in charge of sales of lubricating oils, greases and special products. Company headquarters are at 555 North Flower Street, Los Angeles.

Petrol Corp. Result of Work And Vision by Ed Pauley

PETROL CORP., a comparatively young organization so far as the California oil industry's history is concerned, may properly attribute its conception to a broken neck. For Ed Pauley, president and founder of the company, visualized the concern which he has built since 1929 while recovering from just such a fracture received in 1928 in an airplane crash.

Foundation of Petrol Corp. goes back to Mr. Pauley's profit of $15,000 as his share of a gasoline syndicate which was his first venture after being discharged from the hospital in 1928. Now the company is a fully integrated unit operating a 5,000-bbl. refinery at Los Angeles, producing properties in several fields, overland transportation and marine loading facilities and sales outlets covering a substantial marketing area in the Pacific Coast district. In the comparatively brief 12-year life of Petrol Corp. there are numerous highlights all of which exerted their relative influence on the present corporate structure.

Searching for facilities with which to establish a more balanced operation and thus remove dependence on others for materials to sell, Mr. Pauley, using his $15,000 profit from the gasoline syndicate, succeeded in negotiating an operating contract on the then-idle refinery of Eureka Oil Co., at Vernon, Calif. He leased the small plant and agreed to pay a stipulated sum for every barrel of crude run through the refinery.

Cooperative Deal for Crude

Crude for refinery operations was first obtained through a cooperative arrangement with producers in the Huntington Beach district. Mr. Pauley agreed to refine the oil and share profits with crude suppliers from the sale of products. By midsummer of 1929, Petrol's 1,500-bbl. plant was operating at capacity. At the end of 1930, Mr. Pauley negotiated purchase of the Eureka plant. Refining capacity was increased and new outlets were found for products. Speed of the company's growth is revealed by gasoline sales of 15,000,000 gal. in 1931.

Advantages of producing all or at least a part of the company's crude requirements next drew attention of Mr. Pauley. Petrol Corp. entered the producing end of the business late in 1932 in the Huntington Beach field through purchase of a number of wells and the drilling of others. Harold Pauley, a brother of the founder, joined the company and with his technical background as a graduate engineer from Stanford applied his energies at first to development of production. E. E. (Slim) Hampton, drilling superintendent, was brought into the organization by Harold Pauley.

During 1933, a particularly trying year for the California oil industry, Ed Pauley and James P. Fitzpatrick, who had shared in ownership and development of Petrol Corp. since its organization in 1929, continued the program of expansion and improvement.

An even more ambitious program of developing production was launched in 1934. Under Harold Pauley's direction the company's producing program continued to expand. In 1935, Petrol secured leases in the Mountain View Weed Patch field and that year drilled six more wells. Total production of the company's 14 Huntington Beach, Del Rey Hills, and Mountain View wells was almost 1,000,000 bbl. for the year.

In 1936, Petrol entered the Redondo field and brought in three successful wells. From these wells and the company's other southern California properties, the Petrol refinery received an average of 100,000 bbl. of crude a month during the year.

Leases on 2,800 acres of proven and prospective oil land in the Gato Ridge field, Santa Barbara County, were acquired during the fall of 1936. Drilling on the first well, 1-A Tognazzini, was completed in January 1937, and the producer registered a daily potential of 2,400 bbl.

Meanwhile, the Petrol Corp. constructed a marine terminal on the deep-water channel of Los Angeles Harbor. Also, the company had acquired a marine terminal and bulk storage facilities at Tacoma, Wash. A refinery with capacity of 2,500 bbl. daily and a marine terminal were also acquired at the Port of Stockton, Calif. The company owned a tank farm at Wilmington and operated gathering lines in the six fields where its 25 wells were producing.

Another marine terminal was constructed during 1938 to handle Petrol Corp.'s production from the Gato Ridge properties. It is capable of loading 6,500 bbl. of crude an hour into ocean tankers berthed ⅝ mile from shore.

Producing operations have been extended apace with refining, transportation, and marketing giving the company a balanced integrated position among the most substantial independent companies of the Pacific Coast.

Key men in Petrol Corp.'s organization are:

Claude L. Cameron, director of finances and budgets, educated at the University of Minnesota school of business; joined Petrol Corp. in 1936.

Robert J. Young, comptroller. He joined the Petrol Corp. in 1930.

Alex J. Diepenbrock, production engineer, grad-

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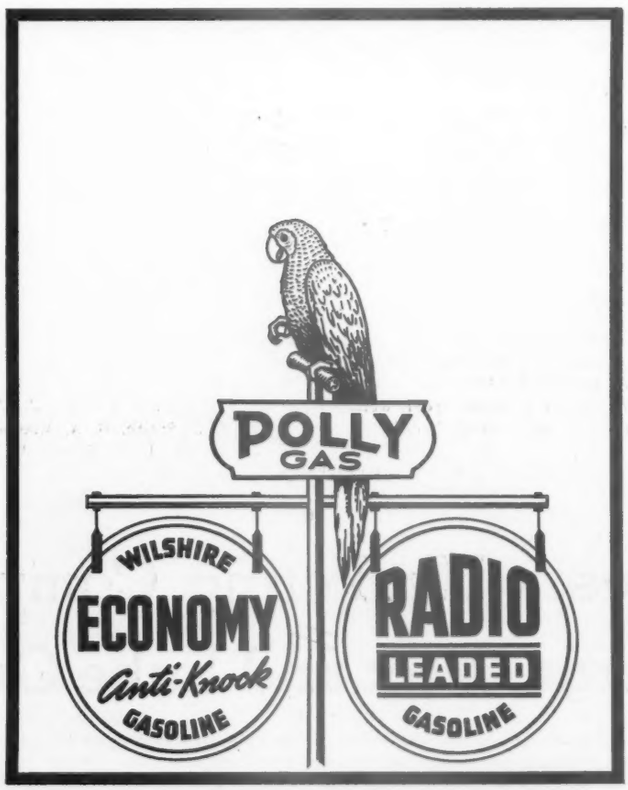

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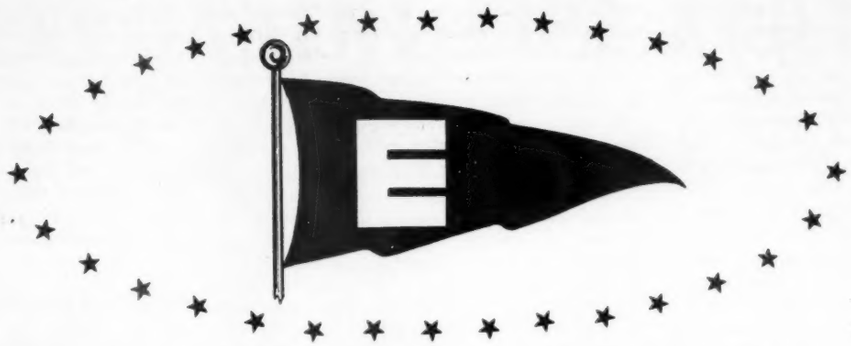
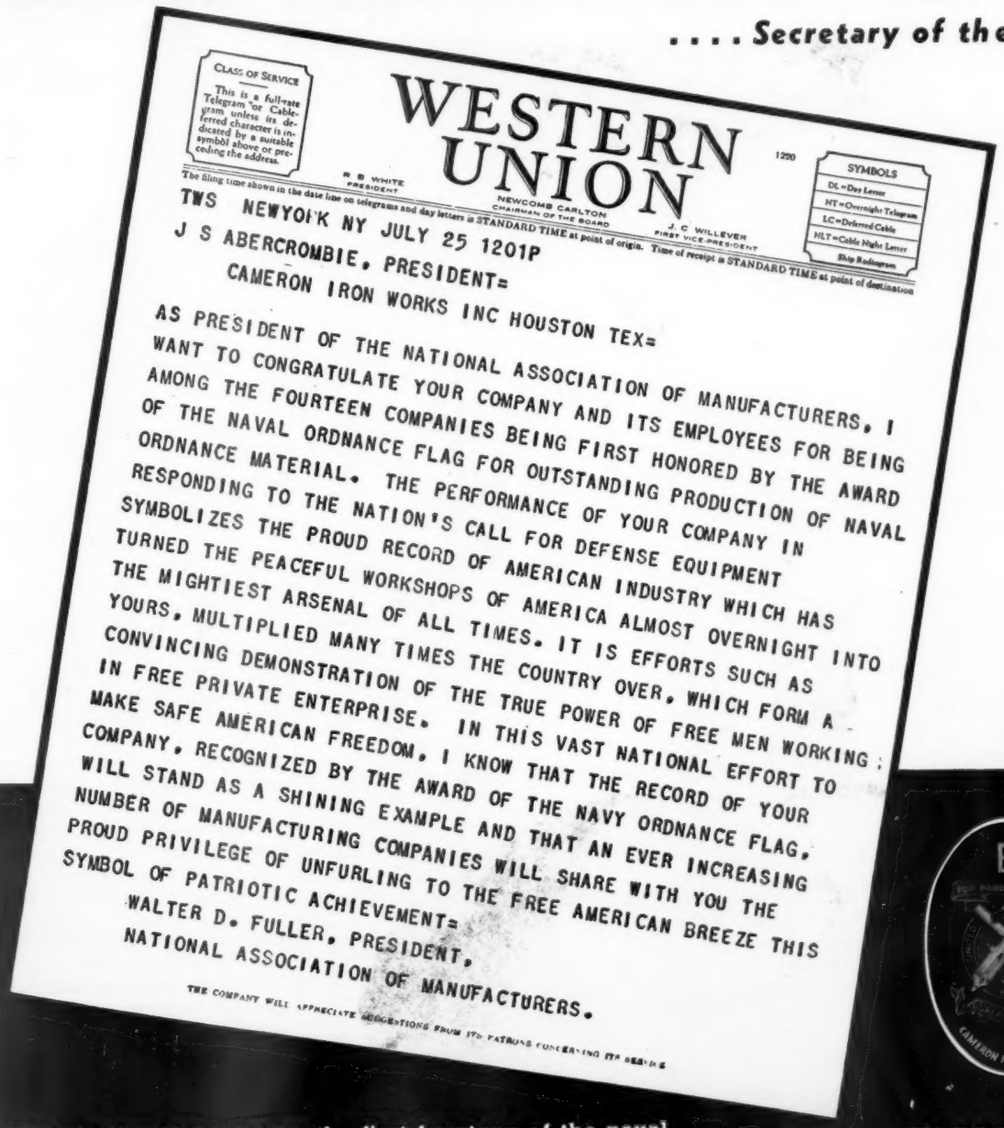


"WE'VE ASKED FOR MIRACLES OF INDUSTRIAL PRODUCTION AND WHAT'S MORE WE'RE GETTING THEM"

. . . . Secretary of the Navy Knox



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AS PRESIDENT OF THE NATIONAL ASSOCIATION OF MANUFACTURERS, I WANT TO CONGRATULATE YOUR COMPANY AND ITS EMPLOYEES FOR BEING AMONG THE FOURTEEN COMPANIES BEING FIRST HONORED BY THE AWARD OF THE NAVAL ORDNANCE FLAG FOR OUTSTANDING PRODUCTION OF NAVAL ORDNANCE MATERIAL. THE PERFORMANCE OF YOUR COMPANY IN RESPONDING TO THE NATION'S CALL FOR DEFENSE EQUIPMENT SYMBOLIZES THE PROUD RECORD OF AMERICAN INDUSTRY WHICH HAS TURNED THE PEACEFUL WORKSHOPS OF AMERICA ALMOST OVERNIGHT INTO THE MIGHTIEST ARSENAL OF ALL TIMES. IT IS EFFORTS SUCH AS YOURS, MULTIPLIED MANY TIMES THE COUNTRY OVER, WHICH FORM A CONVINCING DEMONSTRATION OF THE TRUE POWER OF FREE MEN WORKING IN FREE PRIVATE ENTERPRISE. IN THIS VAST NATIONAL EFFORT TO MAKE SAFE AMERICAN FREEDOM, I KNOW THAT THE RECORD OF YOUR COMPANY, RECOGNIZED BY THE AWARD OF THE NAVY ORDNANCE FLAG, WILL STAND AS A SHINING EXAMPLE AND THAT AN EVER INCREASING NUMBER OF MANUFACTURING COMPANIES WILL SHARE WITH YOU THE PROUD PRIVILEGE OF UNFURLING TO THE FREE AMERICAN BREEZE THIS SYMBOL OF PATRIOTIC ACHIEVEMENT=

WALTER D. FULLER, PRESIDENT,
NATIONAL ASSOCIATION OF MANUFACTURERS.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

That we should be among the first fourteen of the naval ordnance producers in America to be awarded the Bureau of Ordnance Flag and the coveted "E"—the U. S. Navy's highest award for excellence—is an honor of which we are justly proud.

CAMERON IRON WORKS, INC. • Houston, Texas

HONOR BADGE

Cameron Iron Works employees are permitted to wear this lapel emblem as a result of the company's outstanding record in naval ordnance production.

uated in engineering from the U. S. Naval Academy and in geology from the University of California. He became production foreman of Miley Oil Co. in 1923; joined the Venezuela Gulf Oil Co., at Maracaibo, as chief production engineer in 1925; was appointed petroleum engineer for the California State Division of Oil and Gas in 1932; became Westside San Joaquin Valley geologist for General Petroleum Corp. in 1934. Joined Petrol in 1936, and became chief engineer in charge of all drilling and production activities in 1937.

E. E. (Slim) Hampton, drilling superintendent, started in the oil business as a roustabout and driller in 1913, working with Associated Oil Co. and later with Wilshire Oil Co., with a period of time in the interim spent in Texas. When Petrol entered the production field in 1933, Mr. Hampton joined the corporation, and has held the position of drilling superintendent ever since.

Percy F. Cartzdafner, treasurer, came to California in 1903 at the age of 11, and received his education in the Pasadena schools. Mr. Cartzdafner joined the Pauley family in the oil business and has been treasurer of the Petrol Corp. since its organization in 1929.

George E. Miller, refinery superintendent, entered the oil business in 1908 with the Standard Oil Co. of California at Richmond, Calif. During the following 18 years, he gained a broad experience in nearly every operating department of the oil business. In these years he held important positions with Standard Oil Co., Valley Pipe Line Co., Montrose Refining Co. in Texas, and New Orleans Refining Co. in Louisiana. He supervised construction and operation of the Santa Fe Carbon Co. refinery and California Refining Co. plant during the Long Beach and Santa Fe Springs oil booms. Mr. Miller has been with Petrol Corp. since the day it commenced business and has superintended construction of a major portion of the company's facilities as well as superintending refinery operations.

Sim L. Zane, manager of the land and lease department, took undergraduate work at Stanford University prior to entering the University of Washington law school from which he graduated in 1928. Shortly after graduation he obtained a position with the Standard Oil Co. of California in its land and lease department. Mr. Zane joined Petrol Corp. in 1934 to head its newly formed land and lease department.

●

Richfield Has Production In San Joaquin, Coastal And Southern Districts

RICHFIELD Oil Corp. is a completely integrated unit well entrenched in the western territory. The company's producing properties are located entirely within California. Principal production comes from the Coles Levee, Elk Hills, Midway-Sunset, North Belridge and Kern Front fields in the San Joaquin Valley; the Rincon, Elwood and Gato Ridge fields in the coastal area, and the Long Beach, Wilmington and Huntington Beach fields in the southern area.

Richfield's manufacturing operations are concentrated at its new Watson refiney completed in 1938 near Los Angeles Harbor. The main plant is a double-combination unit for combined topping and cracking. Other units, installed concurrently, include debutanization, stabilization, hydrogen-sulfide removal, dehydration, depropanization, caustic wash and catalytic polymerization. Latest addition to the Watson refinery is an alkylation plant, completed in 1940 for the manufacture of 100-octane gasoline, one of the largest such plants so far constructed on the Pacific Coast. The company owns six natural-gasoline plants.

Richfield distributes to the domestic market through 231 bulk plants and over 4,000 retail outlets in California, Oregon, Washington, Arizona, Nevada and Idaho. Richfield has increased consumer acceptance by devoting a major part of its advertising to public service. For 11 years, 6 nights a week at 10 p.m. the "Richfield Reporter" has sent the latest news of the day over the Pacific Coast radio networks to 2,000,000 listeners. The same program is also rebroadcast to other parts of the world by the General Electric short-wave station in San Francisco, Calif. Reports are that no other program approaches this record of carrying the same sponsor, at the same time, for 11 years.

Richfield transports most of its crude by pipe line. A completely connected system delivers crude from the Los Angeles Basin fields to the refinery. The company's 10-in. Los Angeles-Midway line transports the oil from the Coles Levee, Midway-Sunset, Elk Hills and other northern fields direct to the refinery. Harbor lines transport products from the refinery to the marine terminals at San Pedro and Long Beach.

The company operates its own fleet of tankers and barges and has marine terminals at the ports of San Francisco, Portland, Seattle, San Diego, San Pedro and two at Long Beach.

Richfield has its headquarters in its own building at the corner of Sixth and Flower streets in Los Angeles.

Charles S. Jones is president; W. T. Dinkins, vice president and general sales manager; A. M. Kelly, vice president of manufacturing.

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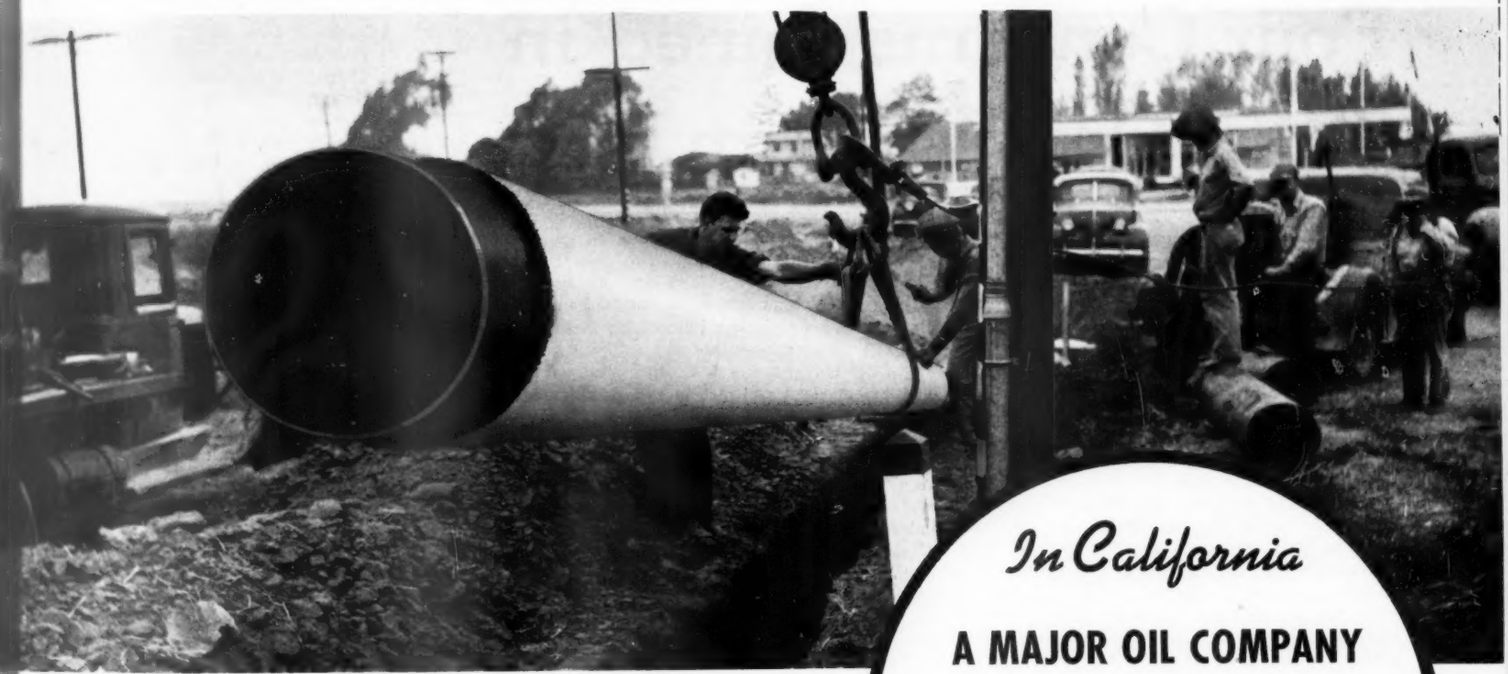

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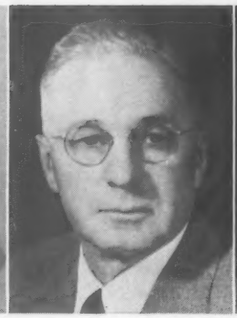

EARL B. GILMORE
President
Gilmore Oil Co.

LAWRENCE VANDER LECK
Vice president
Fullerton Oil Co.

R. P. HUGGINS
General manager
Western Gulf Oil Co.

ED PAULEY
President and founder
Petrol Corp.

Four Concerns Joined in Texas Co.'s Western Unit

TYPICAL of the history of most outstanding American business enterprises, Texas Co.'s present extensive Pacific Coast operations date back to modest beginnings. More than 30 years ago, a group of California's most prominent and colorful oil men founded the four small but successful California companies that served as the nucleus upon which today's widely-known Texaco western organization was erected.

Deciding that in unity there was both strength and efficiency, these four companies had by 1912 been brought together to form the California Petroleum Corp. For some 16 years, this corporation grew and prospered as an increasingly important factor in the California petroleum picture. In 1928, for the sake of greater stability in changing times, California Petroleum Corp. became a part of the Texas Co. through merger with that expanding corporation. This consolidation served to complete Texaco's nation-wide marketing system, and Texaco became the only oil company with distribution of its own branded products in every one of our 48 states.

The first company among the forerunners was American Petroleum Co., organized at King City, Calif., in 1908. Backed by E. L. Doheny, the firm was capitalized at $10,000,000. During its first months the outlook was gloomy, for the California oil industry was emerging from the depression of 1907. The state's 40,000,000 bbl. of crude-oil production for that year represented a sizeable excess, and the average price had been driven down to 37 cents per barrel.

American Held Coalinga Acreage

American Petroleum Co. at the time of its origin had extensive holdings in the Coalinga field. These had been acquired and developed by that company's famous executive vice president, Thomas A. O'Donnell. After spending his first 23 years in the oil-producing country of Pennsylvania, Mr. O'Donnell had come to California, securing a job in the Ventura field in 1890. Mr. O'Donnell learned the California oil business literally from the ground up, and for 4 years worked variously as roustabout, pumper, tool dresser, and driller. Thereafter he organized the drilling contracting firm of O'Donnell & Whittier. During the following 5 years he had a hand in drilling 81 wells for E. L. Doheny and Charles C. Canfield before dissolving the firm in order to acquire producing interests in the Coalinga district.

A few months after its organization, American Petroleum Co., under Mr. O'Donnell's guidance, bought a 253-acre tract in the West Side Coalinga field for $506,000. Five days later an adjoining half section was purchased for $900,000, and within a few weeks another parcel was secured for $179,000. A year later the company was producing 7,000 bbl. per day from the Coalinga field, and had made a contract to sell Associated Oil Co. 7,560,000 bbl. of crude, a deal considered enormous in those days.

In the Salt Lake field near La Brea in the Los Angeles Basin, American Petroleum Co.'s holdings were incorporated under the name of a $1,000,000 subsidiary, the Niles Lease Co. Here two wells found oil at depths of about 1,000 ft. and immediately began to deliver 1,600 to 2,000 bbl. of crude per day to Associated Oil Co. The Niles Lease Co. was the second of the four concerns which were later welded together to form the nucleus of Texas Co.'s operations on the Pacific Coast.

O'Donnell and Doheny Join Hands

Early in 1910, Mr. Doheny and Mr. O'Donnell again joined hands to bring about further development of California's oil industry. This time they formed American Oilfields Co. with a capitalization of $25,000,000, to operate in the Midway-Sunset field. Discovered in 1901, the Midway-Sunset field had grown quite steadily for 9 years, but it was still a small field, producing only 4,500,000 bbl. during its best year. Headquarters for the new company were established at Fellows, Calif., with Mr. O'Donnell in charge as general manager. In that year the first real boom started in the Midway-Sunset. This boom was to carry on without pause for 6 years, making the first the largest in the world of its day.

The American Oilfields Co. had adopted the policy of buying proven oil lands in fee. At the end of its first 2 years of existence, the company owned 1,200 acres within the field. From the first nine wells completed, they were able to produce 17,000 bbl. per day, but these wells were soon overshadowed by three mighty gushers. Last of these was "Old 79," which yielded 25,000 bbl. per day.

After formation of American Oilfields Co. it was only 3 weeks before Mr. O'Donnell organized the fourth and last of the companies that 2 years later were to become California Petroleum Corp. This final component was Midland Oilfields Co., Inc. It was incorporated for $1,000,000 to produce oil from holdings in Kern County. Mr. O'Donnell became its first president.

By 1912, all four of the companies which Mr. O'Donnell had helped to found were standing on their own feet as going concerns. But, being loosely associated, their officers desired to bring them together into an organization that could compete upon equal terms with the leaders of the California oil industry. Thus the California Petroleum Corp. was born, to become known in later years by the familiar designation "Calpet."

Soon after the organization of the new concern, a turning point in the oil industry was reached. The demand for gasoline increased to such an extent that by 1913 its consumption practically equaled that of kerosene. Further, a demand had developed quite suddenly for large quantities of fuel oil, since many ships and railroads had been converted to use this more convenient fuel in place of coal. These changes in the market were met by improvements and increased capacity at the company's topping plant near Fellows.

Export Market Hit

In 1914, California Petroleum Corp. established a record, producing 6,516,784 bbl. of crude during the year. But when the Kaiser's armies marched into France during that summer, depression seized the California oil industry. With exports suddenly cut off, and with California's wells producing at the rate of more than 100,000,000 bbl. per year for the first time in history, the price of crude dropped to 40 cents per barrel. During 1915, with the oil market still depressed, California Petroleum Corp. stored 2,500,000 bbl. of crude. In 1916, crude prices rose to 62 cents average as the first step in a steady rise that persisted through 1921. Upon the American declaration of war, Pres. Woodrow Wilson requested Thomas A. O'Donnell to direct oil production for the entire United States. Mr. O'Donnell accepted the appointment, and served at a salary of $1 per year. With his war service brought to a successful completion, Mr. O'Donnell was chosen first president of the American Petroleum Institute, and returned to Calpet (as it was called) to become chairman of the board and chairman of the executive committee.

In 1921, at a time when an alarming oil shortage had shot the average price of crude in California to $1.80 per barrel, three of the world's greatest oil fields were discovered. These were Signal Hill, Santa Fe Springs and Huntington Beach. Calpet played a prominent part in the great oil boom that followed throughout southern California. During succeeding years the company prospered, and by 1927 the annual sales had risen to exceed $37,000,000.

Up until 1925 Calpet was solely a producing company, and in order to round out its activities

it acquired in October 1925 the Ventura Consolidated Oil Fields, a small but strong company having marketing outlets on the Pacific Coast, as well as producing and refining facilities.

During the years that California Petroleum Corp. was being formed and built up, the Texas Co. had established one of this nation's strongest retail marketing organizations, covering all of the 40 states east of the Rockies. Beginning with the famous Spindletop gusher in 1901, the company had grown to world-wide dimensions. Now it remained only to establish itself on the Pacific slope in order to enjoy the economic advantages of a nation-wide marketing system.

Merger Natural Development

Thus the merger between California Petroleum Corp. and the Texas Co. in 1928 was a natural development. It assured the western company a constant market for its crude, and was a most logical step in the growth of the Texas Co.

Upon its entrance into the Pacific Coast area, the Texas Co. began expanding its operations until they now rank with the larger oil companies operating in that part of the country. The refining facilities, consisting of plants at Wilmington and Fillmore, Calif., have been constantly enlarged and modernized, one of the recent additions being the construction of the alkylation plant at Wilmington, Calif., at a cost of approximately $1,000,000 for the manufacture of 100-octane aviation gasoline. Crude-oil production for its Pacific Coast operations is obtained from the various fields in California, and the latest and most prominent development is the joint discovery, along with the Western Gulf Oil Co., of the Paloma condensate field in Kern County, California. Terminal facilities are located in all of the large ports on the Pacific Coast, in order to serve the various marketing outlets.

For 10 years following the Texaco-Calpet merger, the new Texaco organization on the Pacific Coast was headed by C. E. Olmsted, widely known in petroleum circles. In August of 1938, Mr. Olmsted was called to New York to serve as vice president and manager of refining operations for the company. He is at present with the company in New York in charge of foreign production and sales.

Torrey H. Webb succeeded Mr. Olmsted as general manager of Texas Co.'s operations on the Pacific Coast in August 1938. Mr. Webb, a native Californian, was graduated from the Columbia University School of Mines in 1917 and became an engineer for the California Petroleum Corp. in 1926. Shortly after California Petroleum Corp. became part of Texas Co. in 1928, he was made assistant to Mr. Olmsted. He is a vice president of the Texas Co. and still holds the position as general manager of the company's operations on the Pacific Coast, with headquarters in Los Angeles.

Serving as president for the vast activities which constitute Texas Co.'s world-wide interests is W. S. S. Rodgers of New York City. Mr. Rodgers graduated from Yale University in 1907, and after a few years of mining experience he entered the oil business, starting with a producing company in the Midway field, Kern County, California, in the early days of that field. Following this, he entered the service of a refining company in California. Mr. Rodgers entered the employ of the Texas Co. in 1915, and held various positions in the refining, sales and executive departments. In April of 1933, Mr. Rodgers was elected president of the Texas Co., the position he now holds.

•

First Executives of Hancock Co. Still Direct Affairs

THE men who helped J. W. Hancock to bring the company that bears his name through its first 5 eventful years are still managing the concern today. W. J. Reid has been president since the firm was founded in 1923 as Hancock Refining Co. G. P. Deane, who is now vice president, joined the organization in 1927 as comptroller. E. E. Pyles, now vice president, started as manager of the land department in 1927 and is today in charge of all leasing, drilling and production. John W. Hancock, son of the late founder, is the active secretary, while W. T. Hancock, brother of the founder, is treasurer and has been in charge of refining operations since the company's inception.

General headquarters of Hancock Oil Co. of California at Long Beach

Other key men also have long service records with the company. They include C. B. Limbocker who, assisted by Fred O. Graham, is in charge of sales; H. S. Holloway, the assistant secretary who handles fuel-oil sales and advertising, and J. J. Shrewsbury, assistant secretary and comptroller.

The original refinery built by the Hancock company at Long Beach 18 years ago had a crude-oil capacity of 2,500 bbl. per day. Several times it has been enlarged, and with the new facilities now under construction, it is designed to handle 12,500 bbl. of crude per day. When the new equipment is put into use, the plant will be one of the nation's best balanced refineries from the standpoint of serving automotive needs.

Meanwhile, the company has become an integrated concern, operating in all branches of the industry. Three years after its founding the name was changed from Hancock Refining Co. to Hancock Oil Co. in line with the expansion into new fields. Since 1929, the corporate name has been Hancock Oil Co. of California.

Produces 2,500,000 Bbl. Annually

Under curtailment, the company produces about 2,500,000 bbl. of crude per year. Producing leases are located in the Signal Hill, Mountain View, Midway-Sunset, East Coyote, Santa Maria and Wilmington fields. Through a joint agreement with Signal Oil & Gas Co. a 25 per cent interest in Southwest Development Co. is held. The jointly owned operating company has completed 39 wells on leases totaling 900 acres in the Huntington Beach field under an exceptionally well organized development program. Drilling is accomplished with a heavy steam rig which is designed so that it can be skidded easily on track-laying wheels to each new location. Investment in permanent derricks is saved by using a 30-ton derrick-carrying truck-mounted hoist unit for well servicing.

Another concern in which Hancock Oil Co. of California owns a sizable interest is Long Beach Development Co., a firm that was organized to develop approximately 700 acres of tide and submerged lands for the city of Long Beach. Under terms of the agreement Long Beach Oil & Development Co. is entitled to 14.45 per cent of the gross production, and the Hancock company receives 28.5 per cent of this revenue. More than 61 wells have been completed to date on the property.

New Reserves Equal Withdrawals

Recently, Hancock Oil Co. of California has each year succeeded in developing new reserves that more than equal the year's withdrawals. This condition is expected to continue, since the company now holds 12,300 acres of potential oil lands located in various districts of California and in New Mexico.

Export and marine sales have grown until they now comprise 40 per cent of the company's marketing activity. For this trade a marine terminal is operated at Los Angeles which has a loading capacity of 10,000 bbl. per hour and a storage capacity of 275,000 bbl. Motor fuel and lubricants are marketed in the three Pacific Coast states.

Due to its well-balanced operation from field to refinery, Hancock Oil Co. of California has been able to adjust its operations to conditions during the past year of depressed crude and gasoline prices. The same could be said with few reservations concerning the depression of 10 years ago, when Mr. Reid's understanding of the fundamental problems of the petroleum industry of that time led to his appointment on the National Planning and Coordinating Committee of the NRA.

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When operators on No. 1-19 Santa Ana and Fresno Land Co. were unable to complete their well as a flush producer, due to unfavorable sand conditions, Brown's patented well completion method again proved its advantages over conventional well completion technique.

Briefly, the Brown method consists of running the entire bottom hole completion assembly—set shoe, latch-on tool, liner, screen, liner packer, packer setting tool and tubing hanger—on the tubing with only one trip in the hole. This assembly, before and after packer is collapsed, is clearly illustrated in the accompanying drawings. After washing the screen as long as desired, a few right hand rotations releases the tubing from the set shoe; the tubing is picked up a few feet and then lowered to collapse the liner packer; and the tubing is then raised to a pre-determined point and suspended in the tubing head.

Full particulars on this and other Brown completion methods and tools are carried in an interesting brochure titled "Brown Well Settings." Write for your copy today.

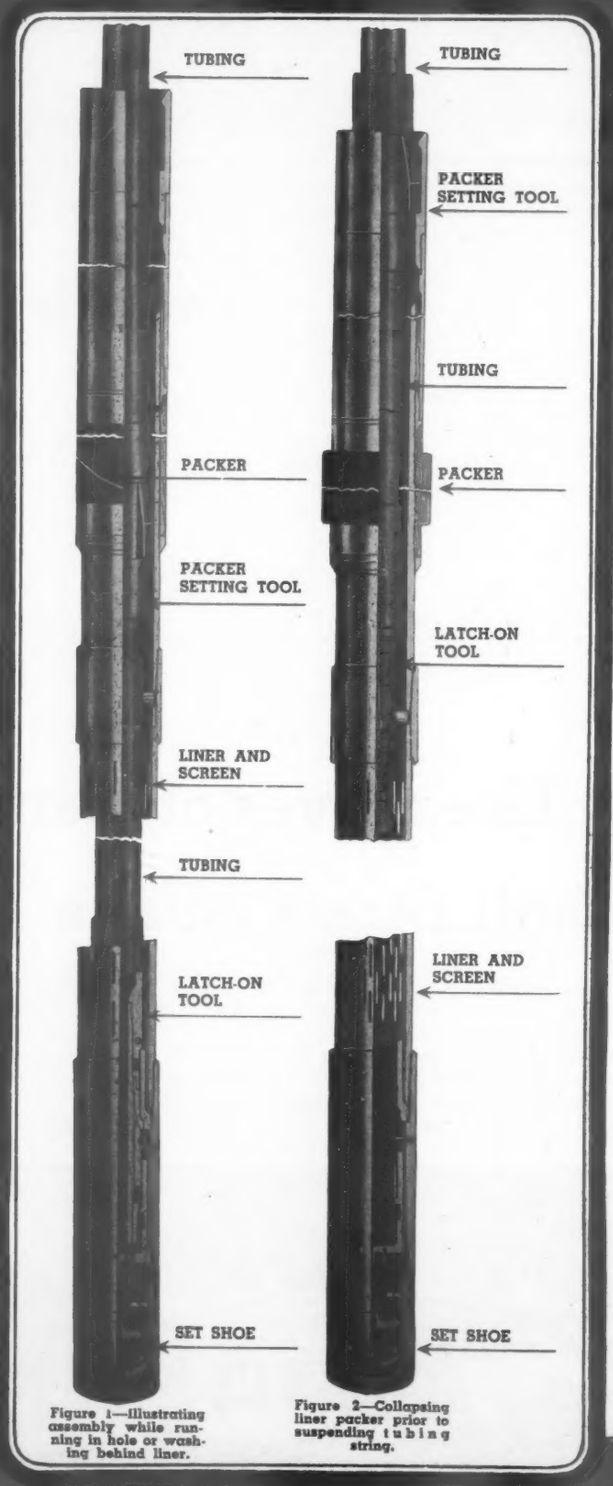


Figure 1—Illustrating assembly while running in hole or washing behind liner.

Figure 2—Collapsing liner packer prior to suspending tubing string.

BROWN OIL TOOLS, INC.
2214-16 Campbell Street • Houston, Texas

Shell Gears Operations To Defense Requirements

WITH national defense the first duty of the nation, Shell Oil Co., Inc., is aiding in numerous ways to further the program laid down by the country's leaders.

An increased schedule of exploration and production is being carried out by Shell to obtain crude petroleum, one of the most vital of raw materials today. Shell's achievement in discovering Ten Section, the first San Joaquin Valley field found through the use of seismograph equipment, has been followed in recent months by the discovery of the Raisin City field, the first oil ever produced north of Coalinga in the San Joaquin Valley. Activities in these and other fields are steadily enlarging the petroleum reserves needed to keep warships, airplanes, and tanks operating for defense.

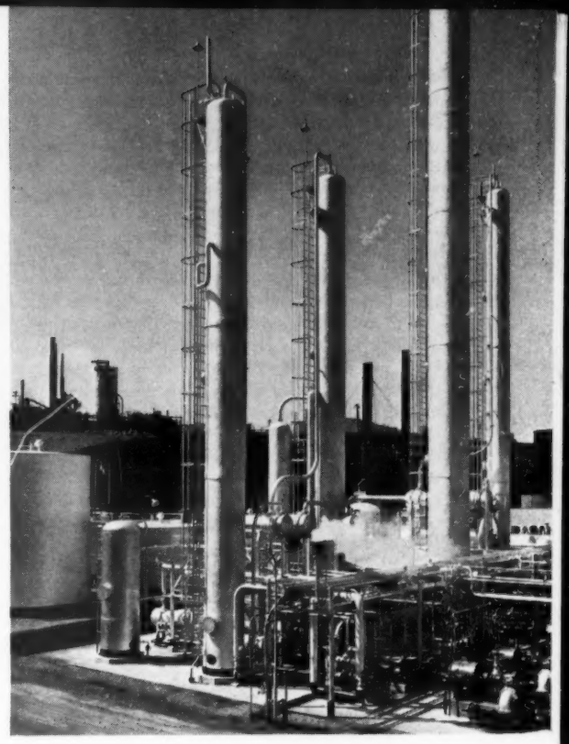
Both the Ten Section and Raisin City fields were located by geophysical exploratory methods in which Shell pioneered in California by introducing the use of the torsion balance in 1924.

Production of 100-octane aviation gasoline has done much to give pursuit planes and long-distance bombers of the United States superiority over those of other nations. Shell was the first oil company in the West to produce isooctane on a commercial scale for 100-octane aviation gasoline. Planes of the U. S. Army and Navy have been using Shell fuels for many years.

Fuel oils for warships, gasoline and diesel fuel for automobiles and tanks, and lubricants for all kinds of machinery vital to national defense, are being turned out in steadily growing streams and delivered wherever forces of the United States need them.

Shell also is producing from petroleum many important chemicals needed for national defense. Some of these are butadiene, a raw material for the manufacture of synthetic rubber; toluene and acetone used in the manufacture of explosives; ketones and alcohols used in the paint and lacquer industry for surface coatings vital to war supplies; cresylic acid used in the manufacture of plastics which in turn serve such purposes as insulating the electric cables which protect ships against magnetic mines. A method has been developed for the synthesis of glycerin which is highly important in explosives. Even in the production of food, Shell gives valuable assistance. Two fertilizers of proved efficiency, ammonium sulfate and Shell agricultural ammonia, are helping to increase yields for American farmers.

All of the products mentioned, and many others, are made from crude, petroleum gas, or byproducts from the oil industry. Research work leading to the development of these and all Shell products was done in the Shell laboratories at Emeryville, Calif. The products are made at Martinez, Wilmington, and Pittsburg, Calif., and in other places in the United States.



Alkylation plant, Martinez, Calif., refinery of Shell Oil Co., Inc.

Union Oil Company Founded By Small Group in 1890

FIFTY-ONE years ago, when California's petroleum industry was just beginning to show promise of a brilliant future, a group of pioneer oil operators, headed by Lyman Stewart and W. L. Hardison, met in Santa Paula on October 17, 1890, and agreed to pool their resources in a joint enterprise. The enterprise was christened the Union Oil Co. of California.

Through its transformation from a small enterprise to its present industrial status, Union Oil Co. has developed and expanded until today it occupies a position of major importance in the industry. It is the largest independently owned oil company in the West.

Although Union was actually incorporated only 51 years ago, the history of the company dates back to the time when Colonel Drake was drilling his first oil well in Pennsylvania. For it was there that Lyman Stewart and Wallace Hardison, cofounders of the Hardison & Stewart Oil Co., began their oil careers. There they gained the experience and money necessary for an oil venture in the West.

Times had been bad in Pennsylvania. The market for kerosene had failed to keep pace with production, and conditions of transportation made it difficult to operate at a profit.

So when E. I. Blake came from California to Titusville, Pa., offering oil sites and reciting stories of petroleum deposits in the coast states, Lyman Stewart responded. The Pennsylvania business was terminated. Some $70,000 worth of drilling equipment was shipped to California, and in 1883, Messrs. Hardison and Stewart established California headquarters in Newhall. They made their own examination of seepages and surface indications in the territory between Newhall and Santa Barbara. Results were apparently satisfactory, for late in the year they leased land on Christian Hill near Pico Canyon and began to drill. Four wells were drilled in succession but in spite of promising indications, they resulted in dry holes.

These failures were a drain on the capital of the partners. They had brought expert operators with them from Pennsylvania, drilling expenses were high. Disappointed and almost on the verge of giving up, the partners secured permission from the Pacific Coast Oil Co. to try once more on the Star lease. Star No. 1 came in for about 75 bbl. a day. Messrs. Hardison and Stewart began at

REESE H. TAYLOR
President
Union Oil Co. of California

A. C. RUBEL
Director of production
Union Oil Co. of California

W. L. STEWART, JR.
Vice president
Union Oil Co. of California

A. C. STEWART
Vice president
Union Oil Co. of California

C. P. WATSON
Vice president
Seaboard Oil Co.

JACK J. DOYLE
President, Oil Producers Agency of California

once to acquire new leases in the Santa Paula district. Numerous wells were drilled in Adams, Saltmarsh, Wheeler and Aliso Canyons, and on the John Smith ranch in Santa Paula Canyon. Some of these came in for small quantities of oil, and others had to be abandoned. The low production, mostly about 10 bbl. a day, was not sufficient to offset the cost of caveins, fishing jobs, and dry holes. Thus by 1887, it is not surprising that the Hardison & Stewart combine was in a bad way financially.

Without adequate funds to continue their operations, and yet sure that success was in sight, they tapped every possible source of aid. They checked up on their assets, made arrangements to sell their home properties, and actually did sell stock, mules, boilers, engines, and miscellaneous equipment in order to continue operations. In this predicament, Mr. Stewart went to Los Angeles and asked for a $30,000 loan from his friend, Isaias W. Hellman.

"We already owed him many thousands," Mr. Stewart said later, "and he wasn't especially encouraging. He knew our position was far from strong. He said he was sorry, but he couldn't let us have $30,000. Later, he changed his mind and asked for a full statement of our affairs, which made me tremble. But I got it, and next day Mr. Hellman said: 'Stewart, it doesn't look as good as I'd like, but draw your checks for $10,000 and I'll sign them'."

Then with restored faith and new hope, the pioneers began again from scratch. They started operations on the Adams property in 1884, and were soon rewarded with substantial producers. Adams 4 came in for about 300 bbl. a day, and this may be regarded as the turning point in the fortunes of Hardison & Stewart.

Despite this change in drilling luck, many other obstacles had to be overcome. The oil was variable, some of it yielding only a small quantity of valuable kerosene. Some was viscous, heavy, fit only for use by the young roofing-paper industry. Operators were learning that good grades of California oil lay deeper than in Pennsylvania and were consequently most costly to produce. In addition, increased production threatened the stability of the slim markets for kerosent, lubricants, fuel oil and industrial oils.

Despite these unsatisfactory conditions, the partnership of Hardison & Stewart was being organized to handle all phases of the oil business. On November 10, 1886, the first subsidiary corporation was formed, the Sespe Oil Co. Six weeks later, the 15-year-old partnership was formally incorporated as the Hardison & Stewart Oil Co.

Headquarters had been switched to Santa Paula. At first the firm occupied a one-story frame building, but later moved to a two-story stone building on Main Street. This building still stands, the upper floor being used by the Ventura field department of Union Oil Co.

By 1890, the operations of Mr. Stewart and his associates had reached well rounded proportions. The small Santa Paula refinery was turning out a regular supply of kerosene for which markets were being developed. Annual production of crude oil had reached 65,000 bbl., and a transportation system including rail and water had been partially developed.

It became apparent at this stage that three companies, Hardison & Stewart Oil Co., Sespe Oil Co., and the Torrey Canyon Oil Co. were so interdependent that the mutual interests of all would be served by consolidation. The consolidated organization was capitalized at $5,000,000. Operating equipment consisted of 22 producing wells and a small refinery. Refinery production was limited, and actual uses for petroleum products were few. Kerosene, asphalt, and a small quantity of lubricating oil were the only products for which there was a demand. But constant experiments sought new uses for petroleum. Cooperative investigations were carried on with various industrial concerns in order to create new consumer markets.

In an attempt to enlarge the existing fuel-oil market, Mr. Stewart finally persuaded the Santa Fe Railway Co. to lend him one of their old locomotives. Granted use of the locomotive, Mr. Stewart returned to Santa Paula, and after months of experiment the dream became a reality—the oil-burning locomotive was a success.

Today, the original wells have increased from 22, to over 1,300, and crude-oil production, under California's voluntary curtailment program, has risen to approximately 20,000,000 bbl. annually.

Union Oil Co. is credited as being the discoverer of a considerable number of existing California oil fields and the extension of many others. The company has drilling interests in almost every field in the Los Angeles Basin, and its San Joaquin Valley activities cover a wide area from Bakersfield on the east to Santa Maria on the west, and as far north as Coalinga. Over 1,000 miles of company-owned and operated pipe lines provide the means for transporting the crude oil from the wells to the marine terminals and refineries. In addition to its three refineries located at Oleum, Wilmington and Maltha, the company operates a fleet of sea-going tankers which annually transport approximately 26,000,000 bbl. of crude oil and petroleum products.

The original limited marketing facilities have kept pace with the organization's 51 years of development, and have been expanded into a vast network of distribution centers.

Always well in the lead in its search for more efficient methods of oil production and manufacturing, the company has contributed much to the technical advancement of the petroleum industry.

Honolulu Oil Corporation

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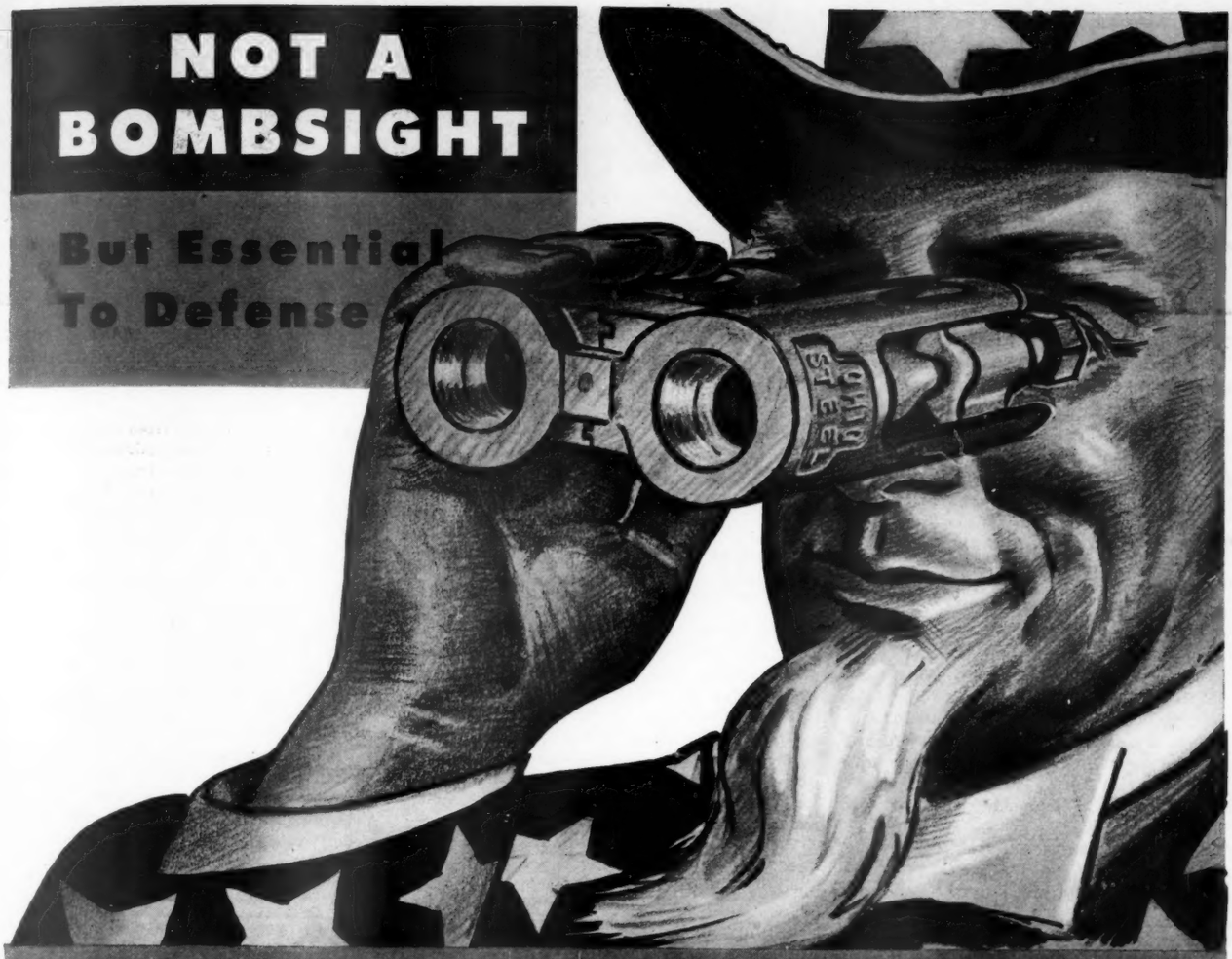

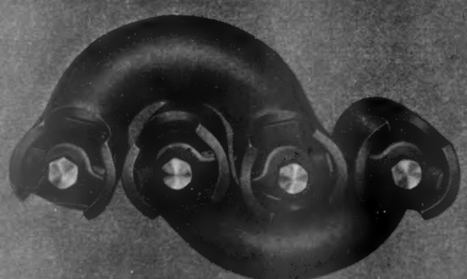

Type 1000 Jump Return Bend

OHIO RETURN BENDS and *FAHRITE TUBE SUPPORTS* are important parts of both new Toluene and Synthetic Rubber units built for defense. The same satisfactory results are being obtained in these units as in hundreds of regular refinery units over a long period of years.

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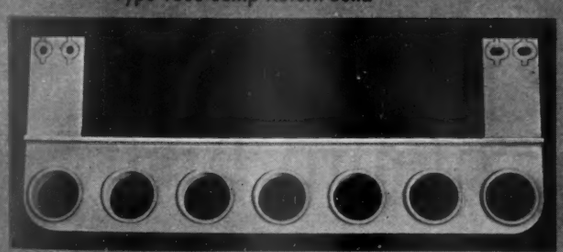

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O. C. FIELD
President
O. C. Field Gasoline Corp.

WM. REINHARDT
Vice president
Union Pacific Railroad Co.

RALPH B. LLOYD
President
Lloyd Corp.

FRANK A. MORGAN
Vice president
Richfield Oil Corp.

O. C. Field Makes Profit On Low-Gravity Crude

AN example of the type of enterprise that has made California's oil industry progress against obstacles can be observed in the Casmalia field of Santa Barbara County. Here, in 1930, a manufacturer of natural gasoline acquired shut-down wells, and through a system of producing, refining, and marketing, has established a profitable business based upon a supply of 8.5-gravity crude which must be pumped from depths of 1,600-1,800 ft.

The firm that has succeeded against these natural obstacles is O. C. Field Gasoline Corp. Organized May 2, 1923, the company entered the natural-gasoline business in the Huntington Beach field. The firm now operates two modern absorption plants in that field and a similar plant in the Montebello field. The Montebello plant was built in September 1939 to furnish an additional outlet for the natural gas which had become a severe problem to oil-producing companies and state conservation authorities alike. At both the Huntington Beach and Montebello plants, the company manufactures liquefied petroleum gases.

The heavy-oil enterprise in the north is the direct opposite of the company's gasoline-plant operations of southern California. The producing process is complete from oil sand to packaged merchandise, and the products are the heaviest made from petroleum, rather than the lightest.

The Casmalia wells were drilled in 1910, or before, by a major oil company. When the O. C. Field interests acquired the properties in 1930 there were a dozen wells on the Arrelanes and Morganti leases, which together comprise about 1,000 acres. These leases are 20 miles southwest of Santa Maria and 8 miles from the coast in Santa Maria Valley.

Production of the 8.5-gravity oil is obtained from the Monterey shale of Miocene age. The shale body is thick and has never been penetrated in this immediate area. The oil zone is a fractured interval averaging about 400 ft. in thickness. This zone is found 400 to 500 ft. below the top of the Monterey formation and is marked by a secondary deposition of chert. It is often referred to as the "chert" zone. Fracturing in this zone is usually attributed to the folding which raised the anticlinal structure from the flat-lying basin deposits

Greetings
to the
Members of
The American Petroleum Institute

BE B SQUARE

BARNSDALL
(California Division)

KINZBACH WHIPSTOCKS

MAKE SIDETRACKING A NORMAL WELL PROBLEM .... NOT AN EMERGENCY JOB!

With the advent of improved whipstocks and milling tools, the operation of sidetracking has come into its own, as a normal well problem, and has ceased to be an emergency measure. Its wide acceptance and practice by the industry has enormously broadened the scope of workover operations.

The whipstock is run on drill pipe to the desired depth, then slowly raised until the trigger engages the pipe end in a coupling. This releases the slip, which is then set firmly by the application of a part of the drill pipe weight. The applied weight also shears the stud, with which the whipstock is attached to drill pipe. Consequently the face of the whipstock is so located that the window will fall within a single joint of casing, eliminating all danger of cutting through a coupling and severing casing. After stud is sheared, setting tool is lowered to wedge the top of the whipstock against casing wall where it cannot interfere with passage of tools down the face. The hinge, permitting this movement, is tightly bolted and does not allow further movement of the concave section, except as forced by wedging tools. The whipstock is anchored against either downward or rotative movement, but can be removed from the hole after having been set. This reduces hazards of collapsed casing, premature setting, or other difficulties that might warrant its removal for resetting. Occasionally an operator finds it desirable to go back into the original hole, even after the completion of a redrilling job, and the whipstock is removed to clear the casing for this procedure. After setting whipstock the setting tool is removed and a milling tool run in on the drill pipe (see top of illustration).

The greatest advantage in using the Kinzbach Whipstock-Mill combination for sidetracking lies in the fact that the casing string remains *intact*, and cannot be completely severed. It means insurance for the user against the complications of a severed string, such as: (1) An unsupported nipple at the bottom end of the upper section of the string, which might unscrew or break off in the hole; (2) Relative shifting of casing sections in the hole; and (3) Loss of the pipe section as a support and guide for deflecting tools.

KINZBACH WHIPSTOCK
ASSURES A MILL-OUT BETWEEN COUPLINGS

KINZBACH MILL
ASSURES A CLEAN CONSISTENT WINDOW

KINZBACH MILLS

Tool steel blade inserts are machined, ground, and hardened before being inserted into the body. This construction enables the manufacturer to use materials and treatment suited to a particular purpose, without compromise. The clearance and rake angles on these inserts control their cutting action, and can be accurately controlled in this construction. Ample clearance is provided for passage of drilling fluid and cuttings about the mill body. The blades are inserted at an angle with the axis of the tool, retarding any tendency to take too heavy a cut, or to "corkscrew" or "roll off" the face of whipstock before sufficient length of window has been cut.

KINZBACH TOOL CO., INC. HOUSTON, TEXAS, U. S. A.
CALIFORNIA REPRESENTATIVE: S. R. BOWEN COMPANY
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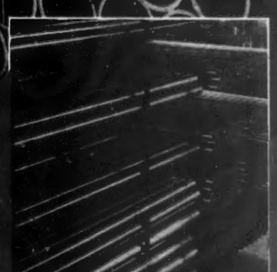
KINZBACH

FLUPACO* BARREL TUBES ARE MADE THE HARD WAY!

FLUID PACKED'S specialized manufacturing process is producing pump barrels so downright hard after their heat-treatment that special honing machines are required to finish every Flupaco barrel. But—this is only one step in the developments Fluid Packed has recently pioneered. Years of study and experiment have been spent in "boiling down" manufacturing problems to find improved methods of making better pumps for your wells!

In fact, the processes recently developed by Fluid Packed have made possible designs previously impractical to achieve with ordinary facilities. Today these pumps—using the special hardened and honed Flupaco barrels—are proving the soundness of their designs with dollar-saving field performance. So, for unbeatable service and economy in any oil-field pumping application . . . specify FLUPACOS!

*The name Flupaco denotes a complete line of oil well pumps.



Flupaco buys only the finest of selected alloy steel tube stock

This stock is heat treated in Fluid Packed's own furnaces...

Then hand straightened to insure a perfectly true barrel...

And honed in special multiple spindle precision machines

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and resulted in the accumulation of oil at this particular point.

Upon acquiring the heavy-oil producing properties, the O. C. Field interests immediately undertook construction of a refinery under the name "Casmite Co." Although this move came during the most dismal days of the depression, it was considered necessary because former operators had encountered their most difficult problem in attempting to move the tar-like crude from stock tanks to their refinery. Steam lines had been used for heating the pipe line and all lease lines.

The refinery constructed in 1930 and 1931 has been since in constant use. It is a straightrun-distillation unit with an oil-fired retort and a fractionating tower. Shell stills are used for manufacturing oxidized products. Other facilities include an emulsifying plant and a packaging plant.

As soon as the refinery was complete, production was started. The wells are equipped with regular 2¾-in. plunger pumps. Four-inch tubing is used to reduce the resistance to flow in so far as possible. Most of the wells use 1-in. rods which are actuated by wooden-rig fronts powered by electric motors which drive through countershafts and long belts.

The bottom-hole temperature in the wells is about 150° F. The oil in all but one well retains enough of this heat to reach the surface without the necessity of measures taken to reduce the viscosity. In one case, distillate is pumped down through a macaroni string to enter the tubing just above the pump. At the stock tanks, distillate from the refinery is mixed with all of the crude, making it possible to pump the oil cold to the refinery.

In its natural state the oil more closely resembles natural asphalt than any other domestic crude yet produced. As soon as the small fractions of gasoline and kerosene have been removed, the bottoms meet practically all specifications for asphaltum. For this reason all products of the refinery, including roofing asphalt, pipe dip, emulsified asphalt, road oils, and all grades of paving asphalt, are made without cracking.

Shortly after the refinery began operation, the company's research department sought means of producing lamp black from Casmalia crude. This work led to the organization of a jointly-owned concern known as Blacks, Inc. The firm's product is a soft carbon black differing somewhat from that made by burning gas.

Since taking over the Casmalia leases the new owners have drilled two new wells. Production varies because the wells are operated only to the extent of the product sales. The year-round average is about 1,000 bbl. per day, but winter production is less because road-oil demand slumps.

The Casmite Co. remained in existence until 1936, during which time the properties of Vaquares Major Oil Co. near Lompoc were acquired. From 1936 to 1940, Casmite Corp. served as the marketing organization, but now all operations are under the name of the parent company, O. C. Field Gasoline Corp.

●

Honolulu Oil Co. Formed By Matson to Insure Oil For Early Steamship Line

The history of the organization, growth, and development of Honolulu Oil Corp., and its predecessor corporations is closely linked with that of its founder, Capt. William Matson, a leader in business and civic affairs, and a man of keen vision and indomitable perseverance, whose life for 50 years was connected with many of the most important developments in California and the Pacific trade.

To insure and control an adequate supply of fuel oil for the growing fleet of the Matson Navigation Co., Captain Matson, in the years 1908-09, embarked on one of the largest oil-development

E. W. HUTTON
Vice president
Refiners Marketing Co., Ltd.

WM. H. HENSZEY
President
Refiners Marketing Co., Ltd.

F. E. FOSTER
Director, California
Oil and Gas Association

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Institutional, *he says*

that's the kind of ad we want—just indentify the organization. Let's not say a word this time about our excellent Pennsylvania and Mid-Continent Oils, Waxes, etc.

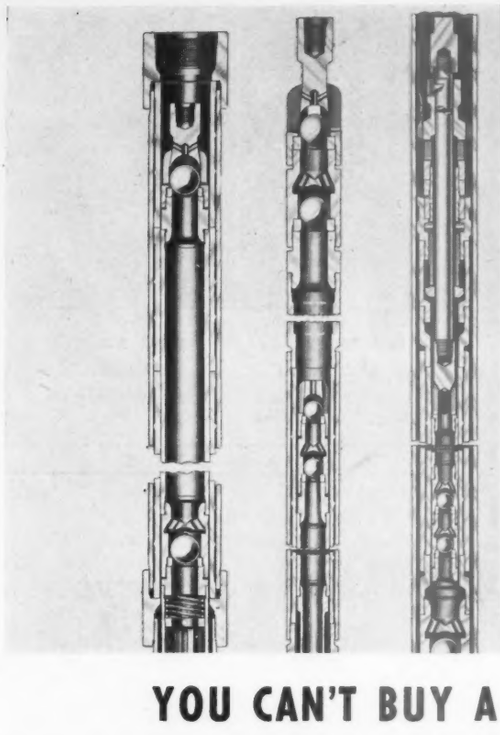
We're just a West Coast organization and are mighty happy to play host to the A.P.I. in this land of eternal (?) sunshine and sunkissed (?) beauties.

So you see, we want them to have a good time and let's not toot our own horn too much—just make it Institutional. But—Oh Yes, you might add, we have bulk plants at Los Angeles, San Francisco and Oakland.

We Ship by Carload, Train Load, Ship Load.

REFINERS *marketing* COMPANY·LTD

WM. H. HENSZEY, *President* .... E. W. HUTTON, *Vice-Pres.*
555 S. Flower St., Los Angeles — *Telephone* Michigan 3424



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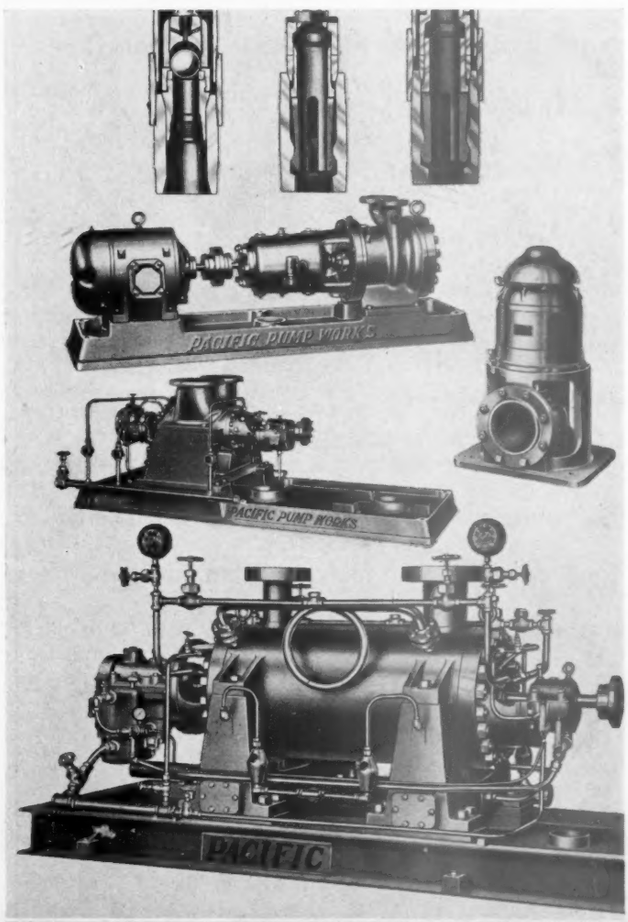
YOU CAN'T BUY A BETTER PUMP THAN PACIFIC



Wherever the going is tough you will find Pacific Pumps operating satisfactorily. That is to be expected, for Pacific engineers are specialists in their line, and the centrifugal, turbine, and plunger pumps they design and Pacific mechanics build represent the ultimate in research, materials and workmanship.

The history of Pacific Pumps has been one of consistent progress and development to anticipate and meet successfully the requirements of oil and allied industries. Today Pacific, like many another manufacturer, is faced with problems attributable to war-time conditions. Pacific is meeting these problems as they arise determined to in no way sacrifice quality for quantity. At no time will poor design, inferior workmanship or cheap materials go into any pump bearing the name "Pacific."

At the left are illustrated Pacific Centrifugal Refinery Pumps, Deep Well Plunger Pumps, and Turbine Pumps, the performance of which has won recognition of petroleum engineers as leaders in their particular fields.

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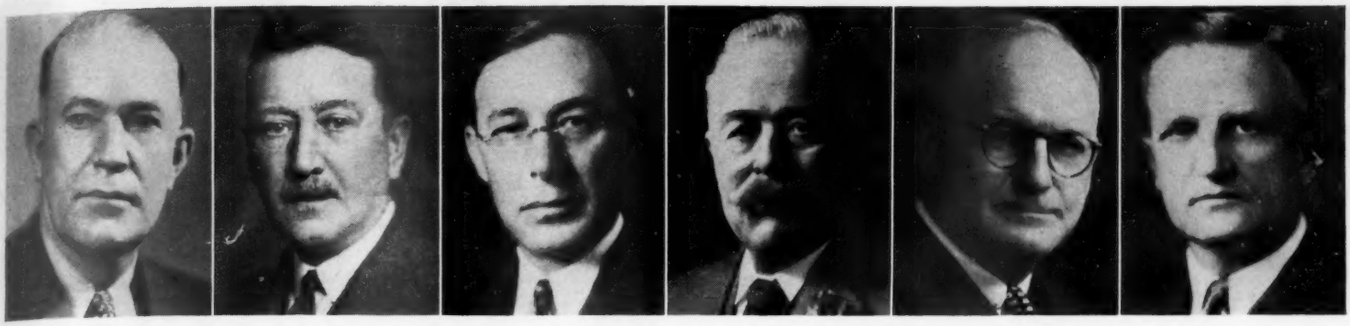
PACIFIC *Engineered* PUMPS



E. E. PYLES
Vice president, Hancock Oil Co., Long Beach, Calif.

A. C. DIERICX
Chairman of board Honolulu Oil Corp.

A. C. MATTEI
President Honolulu Oil Corp.

CAPT. WILLIAM MATSON
(Deceased), founder Honolulu Oil Corp.

RUSH M. BLODGET
Vice president Oil Producers Agency

R. E. COLLOM
Vice president Continental Oil Co.

programs ever undertaken, up to that time, by an independent operator in California.

The properties were located in the Buena Vista Hills, Kern County, California, on fee and government lands controlled by Honolulu Oil Co., Hawaiian Oil Co., and Lakeview Oil Co. of Midway.

In April 1910, the Honolulu Consolidated Oil Co. was incorporated, taking over control and development of all properties of the three predecessor corporations.

On March 31, 1930, the present organization was incorporated as Honolulu Oil Corp., Ltd. (corporate title changed to Honolulu Oil Corp., May 26, 1937); and succeeded to all the assets of Honolulu Consolidated Oil Co.

At the time of incorporation, Captain Matson retained Albert C. Diericx, a naval architect and engineer, to assist in the operations of both Matson Navigation Co. and Honolulu Consolidated Oil Co.

When Captain Matson died in 1917, Mr. Diericx was elected president and continued in that capacity and in active control of corporation affairs until March 16, 1937, when failing health forced his retirement, and he is now chairman of the board.

In 1920, rapid growth of the corporation required the services of an experienced oil operator, and A. C. Mattei joined the staff as assistant to the president. He was elected a director in 1923; executive vice president in 1929; and president in 1937.

In 1930, L. A. Cranson, with a record of 8 years' service in various field positions, was advanced from the field staff, elected a director and secretary of the company, and in March 1937 he became vice president, the position he now occupies, in direct charge of field operations in California.

In March 1930, Prentice F. Brown joined the executive staff of the corporation as Texas manager of operations (having been previously connected with the corporation since September 1926, in preliminary work under the auspices of Fisher & Lowrie), and in February 1940, was elected vice president. He is in direct charge of all operations in Texas and New Mexico.

Associated in the active operations of the corporation have been many names well known in the oil industry, such as:

L. A. Crandall, general superintendent, 1908-09; John A. Pollard, general superintendent, 1910-11; John H. Whaley, general superintendent, 1911-13; Paul M. Paine, general superintendent, 1913-16; Robert R. McGuire, general superintendent, 1916-37; H. S. Stark, general superintendent now, and E. R. Pratt, division superintendent, 1930-37.

Personnel of the officers and directors of the corporation is as follows:

Directors: H. W. Clark, L. A. Cranson, A. C. Diericx (chairman), A. C. Mattei, J. D. McKee, G. G. Montgomery, W. P. Roth, J. W. Speyer, and A. P. Welch.

WELCOME

to the

American Petroleum Institute

Chanslor-Canfield Midway Oil Co.

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The Standard Tongs of the Big Operators

After careful engineering tests, major operators have settled on our tongs as the best. Ask them—they will tell you the results of long use, great strength, perfect fits. No crushed or leaking joints. Ranges that avoid jaw change. You should avail yourself of the many advantages; speed your round trip time. Contractors are enthusiastic.

Specify "Web Wilson" on your next order.

WEB WILSON Oil Tools
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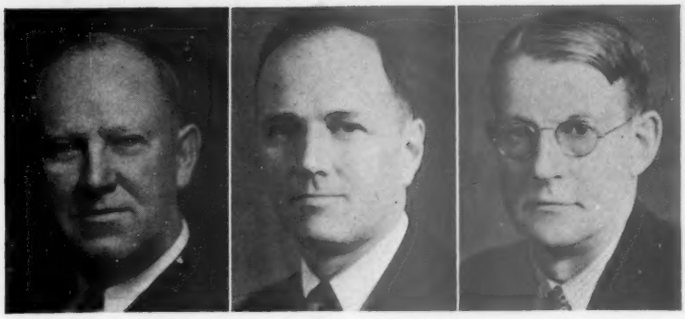

WILLIAM F. HUMPHREY
President, Tide Water Associated Oil Co.

L. F. BAYER
Vice president, Tide Water Associated Oil Co.

L. D. JURS
Vice president, Tide Water Associated Oil Co.

Tide Water Enlarged By Associated Merger

MERGER of Tide Water Oil Co., operating in the East and Mid-Continent, and Associated Oil Co., operating on the Pacific Coast, into Tide Water Associated Oil Co. placed the consolidated concern well forward in ranks of the major units of the petroleum industry.

The Associated Oil Co., predecessor of the present Associated Division of the Tide Water Associated Oil Co., was organized in 1901, shortly after the discovery of oil in the Kern River section of California. Its organization may be attributed to the foresight of such pioneer men as J. A. Chanslor, C. A. Canfield, Max Whittier, W. S. Porter, Burton E. Green and others who were active in development of oil properties in that area.

Following the organization of the company, and for the next few years, activity of the Associated company was confined to the production of crude and the marketing of fuel oil. In 1905, Associated, faced with the problem of providing outlets for the company's production, acquired the Matson Steamship Co.'s interest in several oil projects, including a pipe line from Coalinga to Monterey Bay, a refinery, marine-loading stations at San Francisco and Alameda, and several tankers and barges.

Pipe-line facilities then were capable of delivering 14,000 bbl. of oil daily at Monterey Bay and 60,000 bbl. daily at Port Costa. Then, attention was turned to the construction of refineries. Efficient methods of extracting gasoline and kerosene from California crude oil were developed and there was a growing market for distillate and fuel oil. To meet these requirements and provide other refined products for a growing demand, Associated erected a refinery at Avon, on San Francisco Bay near Martinez. The refinery, completed in 1913 with a capacity of 10,000 bbl. daily, was initially designed to manufacture gasoline, kerosene and fuel oils from crude. In 1919, the Avon refinery was enlarged to a daily capacity of 30,000 bbl. of crude oil. Facilities for the manufacture of lubricating oils also were installed. In 1921, the first solvent-refining unit in America utilizing the Edeleanu process was erected at Avon.

The newest installation of importance at Associated's Avon refinery, completed in 1940, is an alkylation plant for the production of 100-octane gasoline. This unit is now a vital facility in supplying the needs of the United States Government in the national-defense air program. The alkylation plant has a potential of over 1,000,000 gal. per month of 100-octane gasoline. Government contracts awarded for the last 6 months of 1941 call for the delivery to virtually all air fields on the Pacific Coast of more than 12,000,000 gal. of 100-octane gasoline for the United States Army Air Corps.

Tide Water Associated Oil Co., active in producing operations in recent years, has made several important discoveries in California. In October 1938 Associated completed its discovery well in the Aliso Canyon field, in the mountainous area lying approximately 10 miles north of San Fernando in South California. Since the discovery of this important field, Associated has completed 16 producing wells in the Aliso Canyon area. In 1940, this field was again in the news, for with the completion of 12 Porter, the production test revealed a daily potential of more than 12,500,000 cu. ft. of gas yield. This well was the first gas discovered in the southern California area since the Montebello field. The discovery well is especially significant because it is located only 4½ miles from the gas mains leading into the Los Angeles area.

In 1939, Tide Water Associated discovered a new fields in Kern County, California, with the

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Machines

Petroleum Products

HANCOCK Petroleum Products

- GASOLINE
- DIESEL FUELS
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MEN and machines by the millions...all busily engaged in the mighty preparedness program for the Nation's defense... find a willing and important partner in the ever-ready power of modern petroleum products. It is a matter of great pride to HANCOCK that its products are playing an ever-increasing part in helping speed the preparedness activities of the West.

The HANCOCK OIL COMPANY of California

PRODUCERS • REFINERS • MARKETERS

"Welding takes less time when the boss buys MIDWEST FITTINGS"

"The boss says us pipe welders are a big 'headache' to the Estimating Department. On one job we beat the estimated time and he makes real money . . . but on the next job like it (and for no reason), we run way over the time.

"The reason is there, but he hasn't seen it—yet. We cut the welding time and save money whenever he gives us Midwest Welding Ells. The dimensions of these Midwest fittings are always 'right on the nose' . . . and so is the angle. We can cut all our pipe in advance according to the drawings and know it will go in place easily and quickly without any 'phenageling'.

"Another thing we like about the Midwest Ells is that they are really round . . . and the wall thickness is the same all around. And don't let anyone tell you this doesn't save time and make better welds."

You, too, will appreciate the many advantages of Midwest Welding Fittings. Specify them on your next welded piping job.

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

MIDWEST PIPING & SUPPLY CO., Inc.

Main Office: **1450 S. Second St., St. Louis, Mo.** ***Plants:*** **St. Louis, Passaic (N. J.) and Los Angeles**

Sales Offices: Chicago—946 Marquette Building • Houston—2306 Shakespeare Road • Los Angeles—520 Anderson St. San Francisco—426 Call Building • New York—(Eastern Div.) 30 Church St. • Tulsa—533 Mayo Building

completion of E 35-7 K.C.L. This well, opening the Strand field, marked the second major field to be discovered by Associated within 2 years. Since that time additional completions in the Strand field have confirmed the importance of the discovery.

In the marketing of products, Associated has been extremely progressive in the development of modern methods. As early as 1931, Associated started an advanced-experimental program in service-station designing which has led to many important changes in appearance of retail outlets in the West. Importance of consolidating all service units under one roof was first recognized by Associated's station-engineering department and in 1935 the forerunner of the present service station so familiar to western motorists was built by Associated.

Lubrication facilities and comfort stations were incorporated into a single unit of pleasing eye appeal. With many new units constructed on important corners, use of the double-pump islands came into practice with the canopy type of construction generally employed.

Associated likewise pioneered in the use of fluorescent lighting, a development which has in the past 4 years come to be universally adopted for all modern service-station construction.

Tide Water Associated is now in its sixteenth consecutive year of presenting intercollegiate football broadcasts on the Pacific Coast. This phase of customer relations has developed from a small beginning in 1925, when the company pioneered this activity, to a point where, during the 1941 season, a total of 93 college football games will be broadcast throughout the Pacific Coast. Coverage offered western football fans includes the states of Idaho, Washington, Oregon, California, Nevada and Arizona as well as comprehensive coverage to the Hawaiian Islands.

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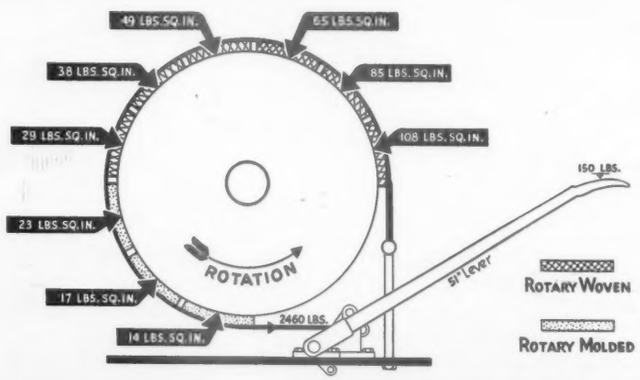

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The extremely high coefficient of friction of F & M Woven Rotary Brake Lining delivers the smooth, positive holding power necessary when drilling at great depths.

Moulded . . .

The abrasive action of the specially compounded ingredients in F & M Moulded Rotary Brake Lining keeps the drums highly polished — eliminates danger of excessive scoring.

ENGINEERED SET

A study of the diagram reveals that braking pressure is not the same at all points on the band. Where pressures are lighter, Moulded blocks deliver a controlled abrasive action that prevents scoring. Where pressures are heavier, Woven blocks are applied, assuring safe, smooth and certain stopping. F & M Engineered Rotary Brake Lining solves the problem.

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DOWNEY • • • • CALIFORNIA

Barnsdall Company Uses Directional Drilling in Developing Elwood Field

BARNSDALL OIL CO., which started pioneer operations in California 38 years ago at a time when gasoline was supplanting kerosene as the principal product, occupies a prominent position in the Pacific Coast oil industry. The history of the company's achievements closely parallels oil development in the state. Its pioneer work began in the McKittrick area and subsequently led to Midway-Sunset in Kern County and to other more recent discoveries. The dominant figure in Barnsdall's California division is R. A. Broomfield, who has been in charge of California operations since the entrance of the company into the West and who for a number of years has been executive vice president of the company which operates on a national scale with crude-oil production in many fields. Evidence that affairs of the California division have been handled in a masterful manner is given by the company's position on the West Coast.

The California division has produced 75,231,383 bbl. of crude oil in addition to large quantities of natural gas and natural gasoline during its existence and has discovered and pioneered development work in seven fields. The total production of the California division to date while large will be greatly augmented by future production from present fields, not the least of which is the Newhall-Potrero area which Barnsdall discovered in 1937 and which is still being developed along conservative lines. Barnsdall holds all of the potentially productive acreage in this field and has proven reserves of substantial proportions from the three Modelo zones that have been found productive to date. The Newhall-Potrero field contains another 5,000 ft. of Modelo formation of Miocene age below present production.

Barnsdall drilled the discovery well in the Elwood field of Santa Barbara County and has substantial holdings in that field today. A feature of development at Elwood is the tideland drilling program that has been accomplished by means of piers and directionally drilled holes. This method of development was generally adopted in the Elwood field and has proved exceptionally satisfactory. Although several wells have been drilled from the same derrick in California, Barnsdall was the first operator to drill multiple wells from the same conductor string by directional drilling and spot them at predetermined locations. Barnsdall's discovery well was drilled on the uplands on the Luton Bell property, but it pioneered tideland development when it became evident that a considerable portion of the structure was located beneath the Pacific Ocean. None of the several piers erected at Elwood have sustained any major damage, although they have withstood several years of pounding by the sea. The Vaqueros and Sespe formations have proved unusually productive and, while the underlying formations have not shown up any too well in primary work, additional deep-zone development may change the outlook. Barnsdall has strictly conformed with curtailment obligations over a long period in California, having started with other operators back in 1919 when proration was launched. This company has gone through several periods of high and low production in California and periods of temporary demoralization resulting from low prices. Now it is firmly fixed on a solid foundation of successful operation and appreciation of the uncertainties that many times confront the petroleum industry.

Safe logging against pressure —

ELECTROLOG OPERATIONS are doubly safeguarded against the dangers of logging under pressure. The use of steel-shrouded line and the Lane-Wells Pressure Packing Gland provide extra safety factors to protect both the well and the crews. If a well starts to blow during an Electrolog run, a secure pack-off can be obtained at the well head without damage to the line. Maximum protection against expensive cable fishing jobs is provided by an adjustable shear-pin principle device which breaks to allow the cable to be pulled free if the formation caves in above the electrode.

These extra safety factors combined with Electrolog's consistently greater detail of formation definition give operators *confidence* to say, "Call Lane-Wells and have the job done right."

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Adequate New Reserves Found To Offset This Year's Output

By L. P. STOCKMAN

PRODUCTION and consumption data for the past decade indicate that California prospectors must find approximately 225,000,000 bbl. of new production annually in order to maintain crude-oil reserves at a uniform level. Previous to this period, it was necessary to discover about 200,000,000 bbl. of new production annually but increased domestic consumption and expansion in foreign markets have raised the yearly requirements, notwithstanding increased efficiency and outstanding advances that have taken place in refining technique. California production at the present time is out of balance because of the superabundance of light refinable crude oil and underproduction of heavy unrefinable grades. This is evidenced by the fact that stocks of heavy crude and fuel oil have been consistently and substantially reduced over the past 3 years. At present, foreign markets comprise only a small part of current demand but, on the other hand, domestic business, reflecting the national-defense program, has shown a substantial gain especially as far as gasoline and fuel oil are concerned. The amount of new production required annually to maintain crude-oil reserves at a uniform level is governed by the amount of crude oil and natural gasoline necessary to maintain an equilibrium between domestic supply and demand and the amount of crude and refined oil moved out of a normal market with proper weight being assigned to any importations from outside sources.

Results of operations during the past 3 years indicate that operators should have found over 230,000,000 bbl. of new production annually but they failed to do so and accordingly crude-oil reserves have declined slightly during this period. There is an excellent chance that discoveries during 1941 may attain the necessary level although much depends upon the results obtained in new areas now being tested out. Crude-oil curtailment, well spacing, gas injection, repressuring and other operating conditions exert a pronounced effect on crude-oil production and obviously also on reserves and ultimate recoveries.

Record of 1940 Discoveries

Discoveries in 1940 were limited to the Del Valle field of Los Angeles County, the Pyramid Hills section of Kings County and the Republic area in the Midway-Sunset district. El Rey Oil Co. completed a producing well on the Westmore Land Co. property northwest of the Athens field in Los Angeles Basin but this well failed to show sustained production and was subsequently abandoned. Of these only the Del Valle field has become a factor of importance. Recent drilling at the extreme western end of this structure has resulted in the completion of several good wells, leading to the assumption that production may extend along this anticline from the Havenstrite section to the Videgain area. These two areas are about ½ mile apart and the intervening area is rather badly broken up by faulting and folding. This field is located in the so-called Newhall-Castaic region which in addition to Oak Canyon and Del Valle includes the Newhall-Potrero and Aliso Canyon fields. The Pyramid Hills field found by Tide Water Associated Oil Co. on May 31, 1940, has not become important as development work has been suspended.

There has been an increased tempo in the rate of discoveries during 1941 and the end of the year is still another 2 months away. The current year started off with discovery of the Vernalis gas field of San Joaquin County by Standard Oil Co., and then followed the Jergins discovery in the Panoche district of Fresno County, Western Gulf's discovery at Oak Canyon, Hancock's find at Union Avenue and Shell's discovery at the Raisin City field. Subsequently, discoveries were made in the Helm district, Jacalitos dome, Shafter, Dyer Creek and Turnbull Canyon. The Vernalis gas field is a commercial gas field quite similar to Tracy which is located in close proximity but production possibilities of the Panoche district of Fresno County remain to be determined as work has been suspended pending the outcome of an investigation of Cretaceous productive possibilities. The Oak Canyon field of Los Angeles County is developing in excellent shape and will prove to be a factor of importance from a production standpoint. Hancock Oil Co., which discovered the Union Avenue field of Kern County on June 2, 1941, has not been experiencing very much success as the second and third wells were failures. The company has since gone back into the second well and is whipstocking across the fault.

Due to constantly changing conditions affecting production and proved acreage it is necessary to change crude-oil reserves from time to time and often several times a year as no method has been advanced to eliminate the personal element in the estimation of reserves. In many instances, insufficient data are available to permit close approximations and in these cases it is necessary to assign arbitrary and conservative estimates that may later be increased as conditions warrant. Such is the case with some fields in the accompanying tabulation showing cumulative production to date, acreage and reserves at the beginning of the current year and at the end of August 1941. It will be noted that Raisin City in the San Joaquin Valley group is only assigned an ultimate expectancy of 5,000,000 bbl. Since compilation of the data, Shell Oil Co., Inc., has completed a well in that field which showed an initial of 1,224 bbl. per day. The previous two completions were somewhat unsatisfactory but it is obvious, in view of this later development, the field can be given an increased expectancy. It might be well, however, to postpone making any adjustment until a little more data are available. Up to the present there have been three wells drilled in the Raisin City field and all three are located in a restricted area. Because of this it is impossible to estimate the extent of the structure and its potentiality although the seismograph showed the apex of the structure to be located north of current development. There is a possibility, too, that an upper zone may be found productive at a position structurally higher. The Raisin City discovery is important because it opens up additional acreage for prospecting north of Coalinga in an area that has been considered unfavorable for the development of commercial production.

Shell's discovery well in the Dyer Creek district of Kern County was brought in as a pumper in the Vedder zone of Miocene age. As no other well has been completed it cannot be given a very high probable recovery. This well was officially completed after compilation of the accompanying tabulation and is not included therein. Dyer Creek is a trap with the accumulation behind a fault as is the case at Mount Poso, Round Mountain, Coffee Canyon, Dominion and other similar fields located around the rim in the eastern end of San Joaquin Valley. The Vedder has been exceptionally productive in these other comparable fields and if Dyer Creek has a sufficient thickness of oil sand it should show a relatively high recovery.

Continental Oil Co. appears to have discovered a new oil field in the Shafter district of Kern County in the San Joaquin Valley but insufficient data are available on which to base an estimate of future production. The productive interval in the discovery well is quite thin and cores showed the formation to be rather tight, a characteristic that has been found in previous wells in this region. Production of the discovery well has been rather irregular and in the absence of more conclusive evidence no reserve is being assigned this area at present.

Helm Discovery Appears Large

Amerada Petroleum Corp. has discovered a new productive field in the Helm district of Fresno County but the potentiality of the area cannot be determined definitely on the basis of the first well. Production tests indicate that the discovery well may be located in a gas-cap area and that additional drilling will prove up the existence of a normal crude-oil zone with a more favorable gas-oil ratio. To date, three zones have been found productive and another higher zone is expected to produce commercially when tested out. The proven pays are in the Cretaceous and basal Eocene around 8,000 ft. and the lower Miocene at 7,448 ft. and 7,000 ft. The new Helm field is located about 12 miles southwest of the Raisin City field which is southwest of Fresno.

Wilshire-Annex Oil Co. has completed a discovery well in the Jacalitos district of Fresno County opening up a new region for future development. Core recoveries from the upper Temblor at 3,865-3,910 ft. showed only about 10 ft. of oil sand so that the future reserve of the field will be held in abeyance pending additional development. The well made several short flows upon being finished but when the flow failed to hold up pumping equipment was installed. The Jacalitos area has been the scene of numerous wells during the past 20 years but Wilshire is the first operator to secure commercial production.

New Field in Los Angeles County

Continental Oil Co. made a new discovery in the Turnbull Canyon district of Los Angeles County as the result of surface geology followed by a seismograph survey that indicated the existence of a structure with favorable closure. This new productive area will not be assigned a future probable recovery until additional data is avail-

able as a result of further drilling. The discovery well has a 74-ft. productive interval, however, and later development may reveal this to be the maximum available or the minimum. The well lacked sufficient natural gas to flow but showed a relatively high fluid level. Continental's discovery is located in 13-2s-11w, about 2 miles north of the Whittier field and approximately 5 miles east and south of the Montebello field. Geologically, the well is located north of the Whittier fault and the productive interval is believed to be the Puente formation of Miocene age. Continental Oil Co. has considerable potentially productive acreage in Turnbull Canyon but a number of other operators also hold leases that appear to have excellent productive possibilities. Leases are small and this should stimulate later drilling.

Large Proven Reserves

Wilmington.—The Wilmington field of Los Angeles Basin and the Southeast Coalinga field of Fresno County are the two most important discoveries of the recent years as far as future production is concerned. In addition to sands now being produced the Ford zone at Wilmington is being left for future drilling. Sufficient data were secured from core samples, however, to rate this zone as possibly the most productive horizon in the field. It has high porosity and a very favorable permeability in addition to a high sand content and a thickness of about 750 ft. The Ranger zone is the most widely productive horizon in the Wilmington field as it extends northwestward toward the Torrance field. Faulting is a very important factor in the Wilmington field and most of the faults are across the axis of the structure. Movement appears to have stopped in the Pliocene period or in the transition period between lower Pliocene and upper Miocene as no displacement is evident in the Pliocene. Each productive block in the Wilmington field is a separate unit and is being developed along that line as there has been no evidence of any migration of oil or gas from one block to another. This field contains more multiple zone completions than any other field in the state and some wells are producing from three zones simultaneously. The so-called Tar zone located above the Ranger zone has not been produced to any large extent but, in the several wells that have produced this zone, initials as high as 1,000 bbl. per day have been recorded. Below the Tar and Ranger zones at Wilmington, production is being secured in the upper and lower Terminal zone and will ultimately be developed in the underlying Ford zone when deep zone exploration is begun.

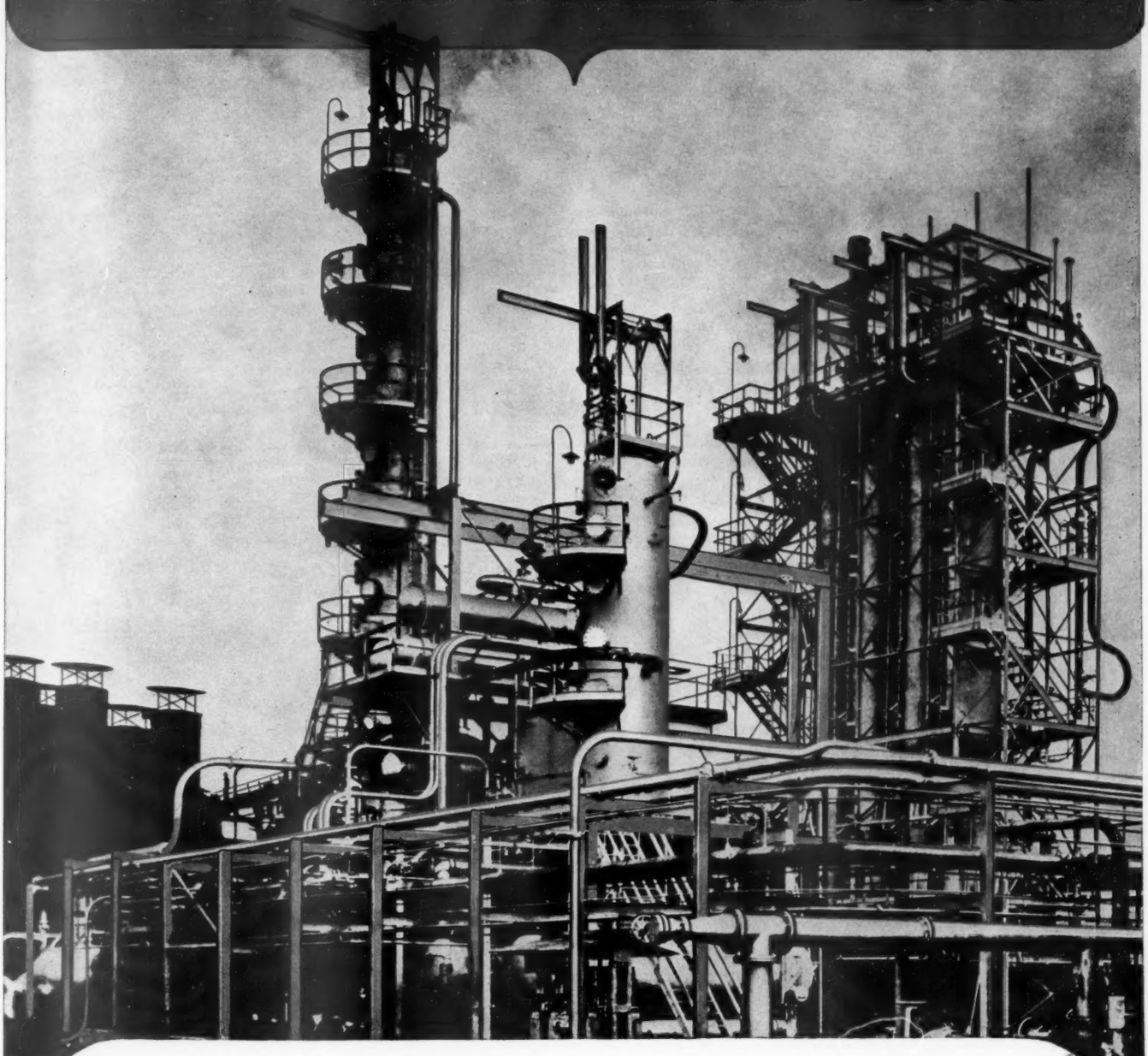
Southeast and Northeast Coalinga.—In the Coalinga area, a shoreline accumulation of Eocene age is being developed east of the old East Coalinga field. For the sake of clarity, the southernmost area has been designated as the Southeast Coalinga field and the northernmost area is designated as the Northeast Coalinga field. Standard Oil Co. is at present drilling up the 1-mile interval between the two fields and all indications point to an ultimate junction. Whether the

CALIFORNIA CRUDE-OIL RESERVES AND RECOVERY PER ACRE TO DATE

San Joaquin Valley—	Year discovered	Crude-oil reserves on Jan. 1, 1941	Production January-August 1941 incl.	Crude-oil reserves on Sept. 1, 1941	Total cumulative production to Sept. 1, 1941	Estimated total ultimate production	Proved acreage	Recovery per acre to date	Total wells, Aug. 31, 1941 — Producing	Shut in or suspended	Total
Arvin	1939	5,407,776	178,496	5,229,280	1,270,720	6,500,000	240	5,295	15		15
Belridge—North	1912	74,387,621	2,425,350	71,962,271	42,053,629	114,015,900	1,000	42,054	84	50	134
Belridge—South	1911	15,877,504	503,981	15,373,523	22,883,807	38,257,330	1,600	14,302	207	89	296
Canal	1937	23,751,572	1,227,359	22,524,213	5,996,516	28,520,729	700	8,566	35	2	37
Canfield Ranch	1938	387,603	10,534	377,069	83,042	460,111	40	2,076	1		1
Coalinga—East and West	1887	58,004,293	2,869,203	55,135,090	366,534,083	421,669,173	14,750	24,850	841	573	1,414
Coalinga—Northeast	1939	63,148,727	2,091,192	61,057,535	3,942,465	65,000,000	1,150	3,428	69	1	70
Coalinga—Southeast	1938	348,590,615	4,050,796	344,539,819	10,956,398	355,496,217	2,400	4,940	130	3	133
Coles Levee	1938	43,334,169	1,398,113	41,936,056	3,074,289	45,010,345	2,580	1,116	47	2	49
Edison	1934	10,793,816	703,032	10,090,784	8,226,724	18,317,508	1,500	5,484	97	11	108
Elk Hills	1919	203,602,837	2,661,120	200,941,717	156,966,516	357,908,233	4,850	32,364	184	128	312
Fruitvale	1928	21,551,499	1,338,035	20,213,464	23,976,657	44,190,121	1,200	19,980	169	11	180
Greeley	1936	66,033,416	1,512,500	64,520,916	5,494,561	70,015,477	1,700	3,232	56	5	61
Kern River and Kern Front	1899	41,785,385	2,654,402	39,130,983	327,457,162	366,588,145	9,500	34,469	1,814	1,011	2,825
Kettleman Middle Dome	1932	991,171		991,171	544,491	1,535,662	240	2,269		3	3
Kettleman North Dome	1928	332,711,321	9,392,850	323,318,471	247,664,844	570,983,315	16,510	15,001	269	63	332
Lost Hills	1910	11,622,423	831,431	10,790,992	52,111,228	62,902,220	2,300	22,657	307	130	437
McKittrick	1887	11,357,296	915,942	10,441,354	92,111,502	102,552,856	1,550	59,427	215	164	379
Midway-Sunset-Buena Vista	1901	216,092,110	11,544,345	204,547,765	906,900,811	1,111,448,576	37,500	24,184	2,703	1,215	3,918
Mountain View	1933	14,601,859	1,306,001	13,295,858	39,363,652	52,659,510	1,650	23,857	164	15	179
Mount Poso	1923	44,260,706	2,463,822	41,796,884	53,706,725	95,503,609	1,850	29,031	309	68	377
Paloma	1939	14,846,915	33,033	14,813,882	186,118	15,000,000	1,250	149		7	7
Raisin City	1941	5,000,000	9,275	4,990,725	9,275	5,000,000	120	77	2		2
Rio Bravo	1937	114,000,760	2,925,162	111,075,598	11,176,814	122,252,412	1,550	7,211	91		91
Round Mountain	1927	31,780,855	1,859,198	29,921,657	30,242,747	60,164,404	1,100	27,493	232	16	248
Strand	1939	6,837,871	346,341	6,491,530	1,008,470	7,500,000	400	2,521	11	1	12
Ten Section	1936	80,235,149	3,314,659	76,920,490	13,673,181	90,593,671	2,080	6,574	108	2	110
Tupman	1938	83,550,443	2,408,097	81,142,346	3,859,322	85,001,668	1,700	2,270	52	9	61
Union Avenue	1940	500,000	29,961	470,039	29,961	500,000	100	300	1		1
Wasco	1938	7,027,546	420,900	6,606,646	1,518,417	8,125,063	350	4,338	13		13
Wheeler Ridge	1922	1,262,597	69,868	1,192,729	3,887,437	5,080,166	300	12,958	34		34
Total San Joaquin		1,953,335,855	61,494,998	1,891,840,857	2,436,911,564	4,328,752,421	113,760	21,421	8,260	3,579	11,839
Coastal districts—											
Aliso Canyon	1938	9,267,022	688,156	8,578,866	1,444,552	10,023,418	500	2,889	13	3	16
Capitan	1929	10,873,120	481,875	10,391,245	5,389,416	15,780,661	240	22,456	51	7	58
Del Valle	1940	9,968,259	368,357	9,599,902	400,098	10,000,000	640	625	6		6
Elwood	1928	12,168,342	785,874	11,382,468	67,937,900	79,320,368	525	129,406	75	11	86
Gato Ridge	1931	15,203,624	867,787	14,335,837	4,994,255	19,330,092	400	12,486	17	3	20
Goleta	1927				136,151		(Field abandoned)				
Newhall-Potrero	1937	12,490,006	602,883	11,887,123	1,892,133	13,779,256	400	4,730	23		23
Oak Canyon	1941	2,500,000	21,395	2,478,605	21,395	2,500,000	240	89	3		3
Padre Canyon	1936	2,565,714	233,914	2,331,800	1,399,424	3,731,224	180	7,775	15		15
Rincon	1927	15,152,964	1,066,900	14,086,064	13,634,274	27,720,338	460	29,640	68	6	74
San Miguelito	1931	18,374,136	713,812	17,660,324	5,666,144	23,326,468	280	20,236	22	2	24
Santa Barbara Mesa	1929	804,804	52,489	752,315	3,442,139	4,194,454	160	21,513	19	2	21
Santa Maria	1903	69,550,338	1,080,355	68,469,983	140,820,350	209,290,333	4,750	29,646	179	266	445
Santa Maria Valley	1934	99,979,243	4,532,271	95,446,972	19,908,888	115,355,860	4,500	4,424	169	19	188
Summerland	1894	31,280	3,081	28,199	3,165,138	3,193,337	100	31,651	6	18	24
Ventura Avenue	1916	178,675,339	8,376,283	170,299,056	234,324,871	404,623,927	2,180	107,488	341	152	493
Ventura-Newhall	1885	14,591,480	1,041,419	13,550,061	63,550,774	77,100,835	4,700	13,521	511	296	807
Watsonville and misc.	Unknown	79,900	6,075	73,825	1,609,288	1,683,113	100	16,093	7	1	8
Total Coastal		472,275,571	20,922,926	451,352,645	569,737,190	1,020,953,684	20,355	27,990	1,525	786	2,311
Los Angeles Basin—											
Brea Olinda	1897	26,266,839	1,374,602	24,892,237	159,688,502	184,580,739	1,550	103,024	364	142	506
Coyote—East	1911	20,672,467	909,413	19,763,054	43,061,302	62,824,356	1,000	43,061	87	61	148
Coyote—West	1909	37,262,045	2,038,508	35,223,537	125,440,190	160,663,727	1,000	125,440	76	95	171
Dominguez	1923	90,204,250	5,631,711	84,572,539	127,494,308	212,066,847	950	134,205	243	67	310
El Segundo	1935	4,296,871	361,889	3,934,982	9,968,388	13,903,370	640	15,576	36	4	40
Huntington Beach	1920	120,424,706	7,103,834	113,320,872	297,893,825	411,214,697	2,150	138,555	592	241	833
Inglewood	1924	50,028,783	3,022,921	47,005,862	123,940,921	170,946,783	900	137,712	200	104	304
Lawndale	1928	216,087	7,444	208,643	1,119,123	1,327,766	25	44,765	3		3
Long Beach	1921	136,987,331	9,975,106	127,012,225	662,260,221	789,272,446	1,350	490,563	1,199	271	1,470
Los Angeles-Salt Lake	1892	865,512	131,528	733,984	66,115,894	66,849,878	750	88,155	98	1	99
Montebello	1917	35,305,250	3,422,149	31,883,101	125,960,524	157,843,625	960	131,209	342	90	432
Playa Del Rey	1929	8,951,193	888,990	8,062,203	47,675,836	55,738,039	660	72,236	140	30	170
Potrero	1928	3,652,695	510,916	3,141,779	4,106,283	7,248,062	120	34,219	22	4	26
Richfield	1919	25,637,590	1,729,783	23,907,807	94,546,913	118,454,720	1,020	92,693	306	51	357
Rosecrans	1924	24,032,005	2,417,118	21,614,887	47,297,880	68,912,767	500	94,596	177	30	207
Santa Fe Springs	1919-21	61,211,700	5,756,385	55,455,315	471,859,680	527,314,995	1,250	377,488	586	77	663
Seal Beach	1926	19,802,262	1,589,800	18,212,462	89,050,988	107,263,450	400	222,627	117	38	155
Torrance	1922	20,575,038	2,145,579	18,429,459	103,679,469	122,108,928	4,200	24,690	618	180	798
Whittier	1898	2,466,191	50,773	2,415,418	25,155,203	27,570,621	600	41,925	38	153	191
Wilmington	1932	400,933,999	20,080,107	380,853,892	129,729,696	510,583,588	3,900	33,264	1,019	20	1,039
Total Los Angeles		1,089,792,814	69,148,556	1,020,644,258	2,756,045,146	3,776,689,404	23,925	115,195	6,263	1,659	7,922
Total state		3,515,404,240	151,566,480	3,363,837,760	5,762,693,900	9,126,395,509	158,040	36,464	16,048	6,024	22,072

Note: "Crude oil reserves on January 1, 1941" differ from those reported in the Annual Number by reason of midyear revisions and addition of new reserves discovered during 1941.

100 OCTANE GASOLINE PLANTS



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Gatchell zone in the two fields is one continuous zone is another matter as it is possible that the zones may overlap and not form a continuous zone. The Eocene accumulation east of the East Coalinga field of Fresno County forms one of the largest crude-oil reserves in the state at the present time. Penetrations of 1,000 ft. in the Gatchell interval are not at all uncommon in the Southeast Coalinga field and porosity and permeability are high. The zone is unusually well saturated. Initial daily production of wells in the Southeast Coalinga field should not be taken as indicative of the potential of the zone because, since there is no advantage in establishing high potentials, operators do not allow wells to flow except through small beans after completion. The Northeast Coalinga field where a gas cap exists is unable to record initials as high as Southeast Coalinga due to high gas-oil ratios. Operators have adopted the practice of blanking off the gas cap and producing from a thin section of the zone. In contrast with this the Southeast Coalinga field has a low gas-oil ratio which may or may not support the belief of some that the Gatchell zone in the two areas is not continuous.

First Distillate Well in State

Paloma.—Paloma, California's first distillate field, is located in Kern County immediately east of Buena Vista Lake but the limits of production have not been determined except on the south flank where Union Oil Co. recently drilled a dry hole. Western Gulf's eastern outpost in 7-32s-27e, may determine the eastern limits of production. The Paloma field, if it proves as large as anticipated, will prove to be an important factor in future production as the Paloma zone of Miocene age has an average thickness of about 350 ft. and produces a high-gravity condensate that is equivalent to approximately 3 bbl. of normal crude oil as far as gasoline content is concerned.

Ohio Oil Co., Texas Co. and Western Gulf are proceeding with plans for unit operation that contemplates incorporation of any additional acreage found productive at a later date. It was the original intention to set up a participating area of 5,898 acres as an operating unit, but this plan was later revised and Ohio, Texas and Western Gulf will proceed with unit operation on 1,600 acres and may later take in any acreage that is found productive. A pilot compressor plant is now nearing completion and this will be used to determine the amount of gas the sand will take so that a properly designed repressuring plant may be erected. One of the present completed wells will be produced and the gas will be returned to the sands by injecting into another completed well. All wells drilled in the Paloma field by Ohio, Western Gulf and Texas have been shut in and will be kept suspended until the result of the pilot test is completed and the distillate plant erected.

North Belridge. — Operators in the North Belridge field of Kern County are nearing the end of an initial 30-day period during which they shut down 34 high-gas-oil-ratio wells and reduced gas production of the field 62,000,000 cu. ft. per day. This curtailment move was started October 12 and is to continue for 30 days, during which a study is being made. North Belridge is one of three fields in the state that show unusually high gas-oil ratios and it has become quite obvious that if the field continued producing gas at a high rate it would adversely affect crude-oil production. Preparations have already been started to reinject the gas back into the formation and additional compressors will probably be set up in the near future. This conservation measure was undertaken voluntarily by the operators involved and is a move to effect more economic production as no physical waste of gas on the surface was taking place. The Temblor in this field has shown such a substantial decline that it is no longer a factor of great importance, but the Wagonwheel zone of Eocene age, on the other hand, produces under a high gas-oil ratio. The Eocene at Kettleman North Dome shows a similar high ratio and the same condition prevails at Northeast Coalinga and in the recently discovered Helm field in Fresno County. This seems to be a marked characteristic of the Eocene in the San Joaquin Valley.

Deepest Known Potentialities

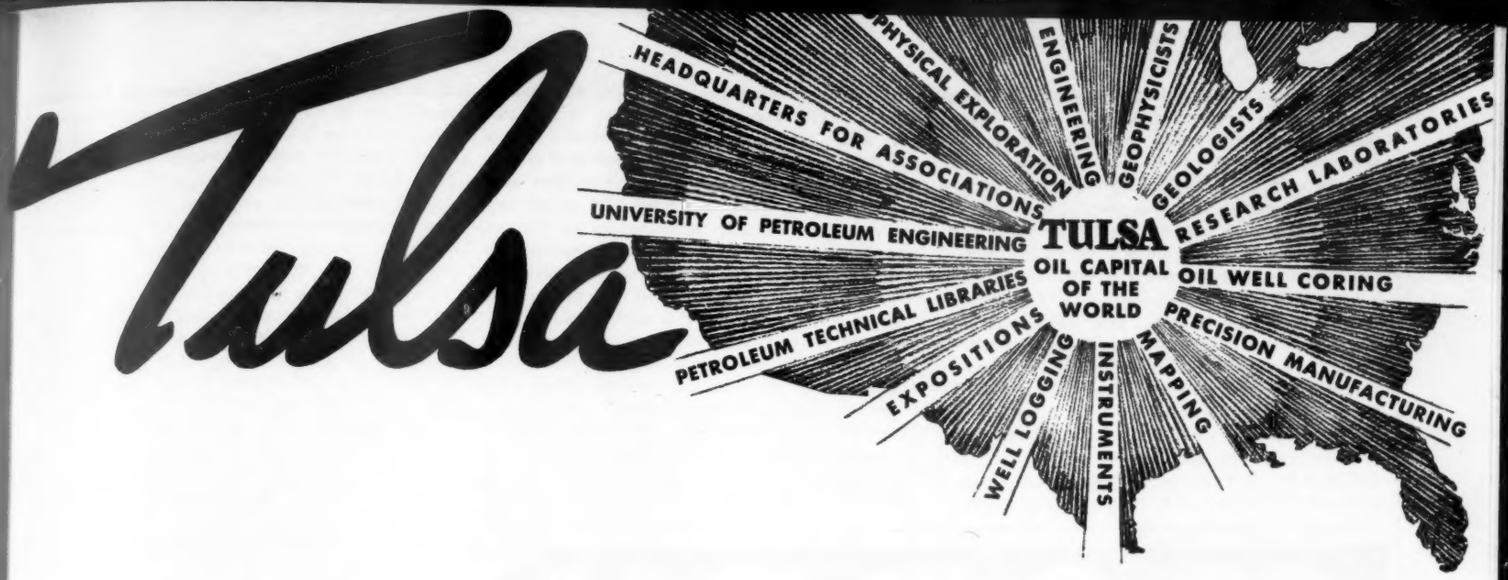
Ventura Avenue. — Venture Avenue, located in the coastal region, has the largest reserve in that area and is one of the outstanding fields of the state, having been discovered 25 years ago. The Ventura anticline, which is one of the larger and more nearly perfect closed oil structures, is unique because it is located near the center of the deepest Tertiary basin in the world. Formations of this age in the district reach the astonishing thickness of 35,000 ft. No other California basin has anywhere near this amount. This unique thickness of strata in the Ventura Avenue field causes the problem of deep-zone development to take on more emphasis because it may later result in the establishment of new depth records. The Pliocene at Ventura Avenue is over 15,000 ft. thick with more than 10,000 ft. to drill through in the center of the field. Wells at Ventura Avenue start about 6,000 ft. below the top of the Pliocene and the deepest completions to date were still in Pliocene when drilling operations were concluded. It appears quite probable that Ventura Avenue operators are practically assured of more or less continuous production down to about 13,000 ft. and in addition other horizons of Miocene and Eocene age, elsewhere productive in California, lie beneath the field at other depths down to or below 20,000 ft. Operating companies in this field are in the position of having several hundred million barrels of high-gravity oil almost certainly present at depths that now appear beyond reach of the drill but which may later be produced. As much oil again as this prolific field has already produced presumably lies untouched in the upper Miocene and as much more again possibly lies at much greater depths.

Rincon.—West of the Ventura Avenue field, but located on the major Ventura anticline attempts are being made to develop deeper commercial production in the Rincon field. Chanslor-Canfield

CALIFORNIA PRODUCTION AND DEMAND—1939-1941

		Offshore shipments		Refinery consumption and commercial sales	Withdrawn from stocks								
	New supply†	Total intercoastal	Total export		Refining crude	Heavy crude	Natural gasoline	Finished gasoline	Naphtha distillates	Gas oil diesel	Fuel oil	Other oils	Total stock decrease
1939:													
January	20,560,486	427,813	4,481,173	13,404,312	*605,767	*73,324	162,578	*1,006,572	*102,982	*149,501	*287,211	184,409	*2,247,188
February	18,566,441	450,277	4,618,146	12,311,852	*1,522,145	3,727	246,512	*774,968	102,680	57,287	471,913	228,828	*1,186,166
March	20,564,300	640,858	5,236,044	14,212,073	*862,525	543,349	152,528	*764,508	182,202	249,747	221,232	197,350	*475,325
April	19,622,619	968,119	4,673,667	13,477,107	*315,151	612,631	*63,502	404,948	*23,120	*444,114	*325,956	349,462	*503,726
May	20,323,947	817,626	5,668,764	14,583,027	*299,794	753,087	*221,927	355,800	67,857	582,113	*214,048	*277,618	745,470
June	19,391,609	1,028,310	5,760,914	14,493,488	1,024,508	235,941	27,047	915,170	*234,791	89,105	250,632	*238,299	1,891,103
July	19,986,777	576,234	5,270,178	14,754,018	605,212	*183,988	43,759	353,898	213,515	262,272	*433,981	*247,034	613,653
August	20,131,795	936,935	5,482,362	15,975,184	324,880	124,379	106,238	443,865	*89,233	*45,146	1,496,224	98,521	2,262,686
September	19,610,394	826,530	5,137,030	15,571,807	760,891	191,773	197,011	*122,554	*37,483	136,539	928,373	*129,577	1,924,973
October	20,295,582	539,928	5,362,001	15,791,929	1,701,274	9,049	159,238	*883,890	223,761	5,686	195,154	*11,996	1,398,276
November	19,545,993	636,565	5,255,998	15,037,511	402,677	411,016	237,026	*673,158	*19,784	94,039	1,217,550	*285,285	1,384,081
December	20,197,713	621,254	4,497,782	15,019,881	*125,249	351,446	126,914	*1,116,714	1,243	208,821	551,565	66,822	*58,796
Total	238,797,656	8,470,449	61,444,059	174,632,189	1,088,811	2,979,086	1,183,422	*2,868,683	283,865	868,638	4,071,447	*1,857,545	5,749,041
1940:													
January	20,139,505	580,730	5,222,842	14,706,639	*321,292	*75,881	*146,445	*790,510	*7,031	571,349	896,045	244,045	370,706
February	18,739,115	409,039	3,610,552	13,074,777	*537,642	*26,934	*85,277	*759,487	*124,314	119,730	341,677	*572,500	*1,644,747
March	19,833,134	553,844	4,140,851	15,227,399	190,574	*93,886	*127,352	105,197	*151,205	*346,661	701,453	*49,570	88,960
April	19,522,595	216,441	4,310,150	13,987,372	*30,749	*20,941	*145,520	*73,066	*20,277	*352,525	*399,491	*105,653	*1,008,632
May	20,179,076	485,050	4,834,374	15,162,799	114,022	241,582	*189,933	367,141	*124,557	*131,527	245,413	*218,994	303,147
June	19,666,053	698,781	4,734,781	15,351,598	531,324	*61,047	*207,831	1,014,248	*146,035	77,212	*26,512	*62,252	1,119,107
July	20,308,032	515,770	4,526,694	16,091,433	*926,211	122,350	*209,277	1,432,620	*32,192	*124,095	808,500	*245,830	825,865
August	20,459,119	836,790	4,447,720	16,173,468	*243,978	399,086	*138,171	373,106	*72,312	*254,782	719,186	216,724	998,859
September	19,530,904	873,108	4,269,515	15,974,185	993,281	234,200	13,199	73,692	95,146	*509,538	760,043	73,265	1,585,904
October	20,164,639	589,878	4,548,657	16,879,541	74,191	233,245	133,243	257,832	98,875	1,012	1,062,153	*7,114	1,853,437
November	19,386,049	532,615	4,254,293	16,252,129	252,135	112,572	71,028	*344,713	*27,895	478,303	874,726	236,832	1,652,988
December	19,905,481	457,390	3,442,091	16,229,130	*873,412	365,756	62,590	*244,979	*95,632	*17,959	983,074	43,692	223,130
Total	237,833,702	6,749,436	52,342,520	185,110,470	*777,757	1,430,102	*969,746	1,263,697	607,429	*489,481	6,966,267	*446,929	6,368,724
1941:													
January	20,042,997	370,735	3,976,126	16,981,928	91,344	12,212	57,720	*478,800	*55,066	321,855	1,094,511	242,016	1,285,792
February	18,212,443	196,943	2,886,395	14,624,034	*1,071,770	*37,339	40,136	*115,638	43,542	*105,460	883,932	*142,474	*505,071
March	20,036,419	509,304	3,972,254	16,359,900	*457,711	105,849	194,328	*92,396	149,693	*107,661	1,067,562	*54,625	805,039
April	19,535,034	440,386	4,221,294	16,944,683	228,226	*26,097	47,399	722,034	*154,263	*227,880	1,356,739	125,171	2,071,329
May	20,488,918	396,907	4,552,586	17,486,459	1,039,523	571,001	21,428	390,100	*84,507	*315,764	435,710	*110,457	1,947,034
June	20,308,915	571,784	4,399,359	16,933,100	1,138,080	527,106	5,953	70,869	99,935	*253,165	48,274	*41,724	1,595,328
July	20,988,531	79,988	3,819,053	17,604,443	*676,306	137,179	*15,590	1,143,690	87,618	*691,265	346,136	183,491	514,953
August	21,097,194	366,403	2,338,186	19,523,348	1,235,220	*356,988	78,711	592,151	*261,948	*1,002,638	875,808	*29,573	1,130,743
Total	160,710,451	2,932,450	30,165,253	136,457,895	1,526,606	932,923	430,085	2,232,010	*174,996	*2,381,978	6,108,672	171,825	8,845,147

*Increase, added to stocks. †Includes crude production and natural gasoline. Source of data: A.P.I. and Bureau of Mines.



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Midway Oil Co. has already completed one deep well but this project at 9,300 ft. only showed small production despite the fact that the log shows over 500 ft. of oil sand. This sand, however, is very tight and lacks porosity and permeability. A second well has been drilled by the same company to 10,515 ft. and has over 600 ft. of oil sand, but it too appears very tight and is not expected to be unusually productive.

Inglewood.—The Inglewood field of Los Angeles Basin, discovered in 1924, and which has produced 123,940,921 bbl. of crude oil since discovery is at present undergoing Miocene development and if this productive zone underlies the entire field the present reserve of 47,005,862 bbl. is totally inadequate. It is a little too early, however, to give much of an increase as most of the development that has taken place is located in a relatively small pocket at the extreme northwestern end of the structure. A number fo excellent flowing wells have been completed in this limited area. In the extreme southwestern end of the field, R. R. Bush Oil Co. and Standard Oil Co. each drilled a well that found the Sentous zone very tight and only productive in a small way. Both of these wells were located rather far out on the structure, however, and consequently could not be expected to prove satisfactory tests. The main thing is that each did find the Sentous zone of Miocene age and this should tend to indicate that a well higher structurally in the southern end of the field should result in production. If the Sentous zone comes up to expectations with respect to areal extent it should add another 75,000,000 or 100,000,000 bbl. to present reserves.

Kettleman Hills.—The Kettleman North Dome field has lost much potential production due in part to wasteful production practices and inability to make any kind of an agreement to restrict production in place of the uneconomic development that took place. A substantial gas contract of one operator with the Pacific Gas & Electric Corp. which took priority over all production was another obstacle that could not be overcome and was responsible to some extent for the refusal of operators holding fee-owned acreage to become parties to the unit plan of development. All through the years, however, Standard Oil Co. and Kettleman North Dome Association have worked together in the drilling and producing of their respective properties in harmony and at agreement in principle. Standard is at present working on an important outpost in the extreme eastern end of the structure and appears to have found production possibilities in a second Eocene zone or in the Cretaceous. This well, which is situated at the very tip of the Kettleman North Dome structure, is the most important well being drilled in the field at the present time. Present production from the field is coming from several Temblor zones of Miocene age and the McAdams zone of Eocene age. No drilling has been done in the Kettleman Middle Dome or the Kettleman South Dome in recent years and the three wells of Standard Oil Co. and Petroleum Securities in the middle dome have been off production for about a year.

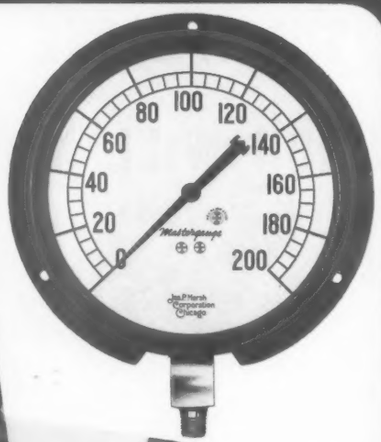
Canal and Ten Section.—The Canal and Ten Section fields of Kern County are fully developed on the basis of one well to 20 acres, but substantially reduced drilling costs achieved by Shell Oil Co. has resulted in the drilling of several wells that is reducing the spacing in the Ten Section field to 10 acres. Production in both fields is developed in the Stevens zone of Miocene age which has proved exceptionally productive in the Ten Section field. Shell is at present engaged in drilling a deep test in the Canal field with the Rio Bravo or Vedder zones as the primary objective. If these prolific zones are found productive, the reserve of the Canal field will be greatly increased and surpass the reserves of many other districts. The deep test at Canal is also of primary importance because if the Rio Bravo and Vedder are found productive in this field they should also be found highly productive in the Ten Section field which is located immediately adjacent to Canal.

Coles Levee and Tupman.—The Coles Levee and Tupman fields of Kern County were found almost simultaneously in 1938, the former by Ohio and the latter by Richfield Oil Corp. Development work has extended both fields closer together but they are separate and distinct structures and it is questionable whether they will actually be found to have a continuous common zone. At the present time the interval between the two fields approximates ½ mile. The productive horizon in both fields is the Stevens zone of Miocene age and only a limited amount of deep drilling has been done to date with the result that probable existence of the Rio Bravo and Vedder zones has not been definitely determined. These two fields are located on bifurcated axes of the Elk Hills field and for this reason deep drilling of Standard Oil Co. at Elk Hills may indicate deep-zone possibilities of Coles Levee and Tupman. Both of the latter fields have been given nominal reserves on the accompanying table of crude-oil reserves and both may greatly exceed present estimated reserves. This is especially true if the Rio Bravo and Vedder zones of Miocene age should be found productive as these deeper zones would add a minimum of 75,000,000 bbl. to the reserves of each area.

Deep Drilling Slows Up

There appears to be a very definite tendency in recent months to stay away from areas that require deep drilling; that is, areas in which a depth of 12,000 ft. or more are necessary to reach the objective. This does not represent inability

MARSH



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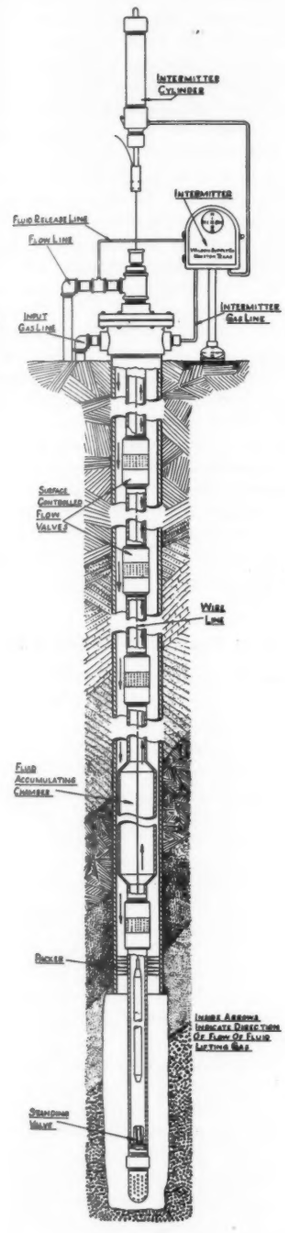
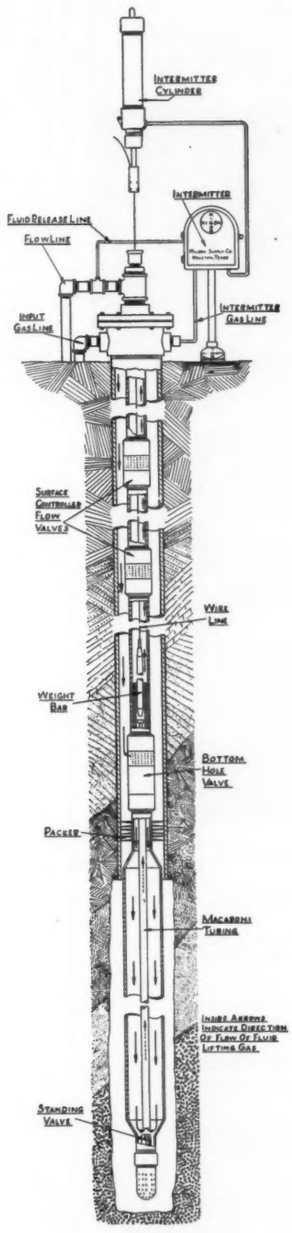


Closed Intermittent Installation with Fluid Accumulating Chamber



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to drill to these depths but rather reflects the inadvisability of drilling to great depths due to the cost involved and the long time required to pay out. This is particularly true of areas that require the constant expenditure of capital investment in conformity with lease requirements. Deeper drilling cannot be avoided, however, and the time is ripe for a general revamping of the various lease forms. Many leases being taken at the present time are exact duplicates of leases taken 20 years or more ago when production was found at relatively shallow depths. Some consideration must eventually be given to the economic feature in connection with drilling obligations involving deep-seated fields. A field that requires the drilling of a well to a depth of 12,000 ft. or more should not carry the same provision as a field where production is secured at from 5,000 to 8,000 ft. The inequities of the matter are obvious in the development costs involved and could be remedied to the advantage of all concerned by standardizing lease forms to cover various conditions. Some allevation could be secured by providing a longer period between wells for the deep fields and the granting of a little higher allowable for wells that come within this class. A graduated base for royalty payments might also be worked out as it would be impossible to eliminate the minimum lease requirement provision. It is noteworthy in this connection also that it might be advisable to provide a declining royalty spread over the period between the start of the pumping period and the stripper-well class. This would prevent premature abandonment of small producing wells.

Trend to Contractor-Drilled Wells

There has been a rather pronounced trend toward the contracting of many wells in California during the past year or so and if drilling contractors are successful in keeping drilling costs down to a minimum the move in this direction will gather increased momentum. The contracting of wells offers a number of inducements to producers as it will permit a general reduction in personnel of operating companies and an increase in the personnel of drilling contractors. In this way the better drillers are given recognition and the less efficient are weeded out or transferred to some other type of work. From early days it has been the policy of California operators to drill their own wells with regular crews, but in many cases this does not reward efficient crews as they are laid off between wells or assigned to pulling jobs. The big problem confronting drilling contractors is the necessity of keeping drilling costs down as many company-operated crews have established enviable records. The trend is toward contract drilling, however, and whether it will continue to increase remains entirely in the hands of the drilling contractors themselves.

●

Award Certificates for Achievement In Accident Prevention

Fifty certificates of accomplishment in accident prevention have been awarded by the American Petroleum Institute to oil companies for their achievements in 1940 on the basis of low injury frequency and severity. Severity rate was 1.44 days lost for each 1,000 hours worked, slightly higher than last year but the frequency was down with 11.59 injuries for each 1,000,000 manhours worked. The injury index for the year was 25.99. Fatalities set a new low record with 30.9 deaths per 100,000 men employed.

A new safe-work record was set by the mechanical division of the Baton Rouge refinery of the Standard Oil Co. of Louisiana with 4,216,600 manhours of injury-free work.

Tanker Diversion and Japanese Embargo Cut California Exports

DIVERSION of a part of California's tanker fleet and the freezing of Japanese credits is having a pronounced effect on shipments of California crude and refined oil to foreign and domestic ports. Recent developments indicate that further restrictions will follow.

Intercoastal shipments of California oil have practically stopped, although a few thousand barrels of refined oil will be moved at infrequent intervals to the East Coast for domestic consumption. Current movement of refined products to the Atlantic seaboard reflects only the amount of oil that is carried east as additional tankers are ordered into British service. Instead of moving a tanker from California in ballast, owners have adopted the practice of sending it east with a cargo. The accompanying table shows the result of freezing Japanese credits and the diversion of Pacific Coast tankers.

When comparing the consistent decline in Pacific foreign shipments during the past several months it should be remembered that it is only within the last few months that Japanese shipments have stopped. In May 1941 the U. S. Bureau of Mines stopped showing shipments to Alaska and Hawaii and consequently these data now appear in domestic consumption. Shipments of refined oil to Soviet Russia are included in the segregation covering Pacific foreign shipments in all commodities. No accurate data are available as to the amount of gasoline and diesel transported to Russia during the past 3 months, but it is probably in excess of 600,000 bbl. Some of this oil was moved in Russian tankers and some in American boats. A large part of the movement was in bulk although some was shipped to Vladivostok in steel drums.

Owners of American tankers requisitioned for the Russian deliveries do not necessarily supply cargo carried by their boats but this sometimes happens. An experience of General Petroleum Corp. indicates the method used in selecting tankers and loading companies. In September, government representatives approached General and asked if the company had a tanker load of a special gasoline. The company stated it could supply the product but did not have a tanker available to move the gasoline to Vladivostok. In

SHIPMENTS OF CALIFORNIA CRUDE AND REFINED OIL TO FOREIGN AND DOMESTIC PORTS
(Includes package goods)

	1940	1939	1938	1937	1936	1935	1934	1933	1932
Crude—									
Atlantic intercoastal	678,871	947,439	924,037	121,170	.....	.....	.....	.....	.....
Atlantic foreign	.....	.....	723,714	648,764	174,000	1,211,000	168,000	256,000	782,000
Pacific foreign	18,488,211	21,813,605	26,050,371	20,152,823	13,128,000	14,288,000	10,070,000	9,252,000	8,737,000
States outside Pacific Coast territory	.....	2,028	.....	.....	.....	.....	.....	.....	5,000
Total	19,167,082	22,763,072	27,698,122	20,922,757	13,302,000	15,499,000	10,238,000	9,508,000	9,524,000
Gasoline—									
Atlantic intercoastal	3,892,504	3,399,414	2,885,032	4,089,469	5,815,000	7,106,000	8,693,000	11,305,000	8,398,000
Gulf intercoastal	72,738	99,688	81,960	55,701	.....	.....	.....	.....	.....
Atlantic foreign	559,327	3,181,744	5,404,733	4,210,085	4,281,000	3,182,000	1,521,000	1,734,000	3,729,000
Pacific foreign	5,782,631	6,043,463	7,430,333	7,877,919	6,084,000	5,514,000	5,408,000	5,956,000	7,547,000
Alaska and Hawaii	1,654,842	1,500,440	1,288,150	1,387,859	1,258,000	1,152,000	1,040,000	985,000	938,000
States outside Pacific Coast territory	1,318,702	1,669,969	1,737,850	2,153,052	2,084,000	1,759,000	1,434,000	1,223,000	1,148,000
Total	13,280,744	15,894,718	18,828,058	19,774,085	19,522,000	18,713,000	18,096,000	21,203,000	21,760,000
Natural gasoline—									
Atlantic intercoastal	.....	.....	.....	.....	.....	1,000	.....	154,000	516,000
Gulf intercoastal	.....	166,045	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	4,575	1,230	7,761	3,746	15,000	531,000	.....	805,000	945,000
Pacific foreign	464,406	531,419	573,091	790,445	709,000	404,000	387,000	281,000	363,000
Alaska and Hawaii	4,748	3,847	3,378	3,271	4,000	3,000	2,000	.....	1,000
States outside Pacific Coast territory	13,818	12,854	10,511	5,435	5,000	3,000	1,000	.....	1,000
Total	487,547	715,395	594,741	802,897	733,000	942,000	390,000	1,240,000	1,826,000
Fuel, diesel, and gas oil—									
Atlantic intercoastal	1,285,752	2,922,043	658,233	726,660	625,000	876,000	13,934,000	6,737,000	1,891,000
Gulf intercoastal	.....	.....	.....	.....	.....	.....	91,000	831,000	170,000
Atlantic foreign	561,809	2,227,612	1,536,926	2,751,837	1,120,000	821,000	1,445,000	572,000	695,000
Pacific foreign	15,454,450	17,656,435	16,571,062	21,348,586	17,376,000	17,125,000	17,252,000	11,581,000	10,801,000
Alaska and Hawaii	5,404,187	4,081,106	3,427,654	3,886,188	3,813,000	3,487,000	3,385,000	2,751,000	3,005,000
States outside Pacific Coast territory	480,547	464,310	464,742	428,519	330,000	126,000	89,000	25,000	95,000
Total	23,186,745	27,351,506	22,658,617	29,141,790	23,264,000	22,435,000	36,196,000	22,497,000	16,657,000
Kerosene—									
Atlantic intercoastal	94,230	390,762	350,315	474,880	1,131,000	1,117,000	1,800,000	1,731,000	570,000
Gulf intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	93,882	847,388	803,971	684,397	663,000	105,000	2,000	82,000	412,000
Pacific foreign	1,383,862	1,598,601	957,376	2,109,663	1,534,000	1,888,000	2,871,000	2,919,000	3,679,000
Alaska and Hawaii	157,506	152,521	132,975	146,737	136,000	145,000	122,000	132,000	119,000
States outside Pacific Coast territory	25,660	28,983	32,214	27,937	28,000	22,000	22,000	22,000	17,000
Total	1,755,140	3,018,255	2,276,851	3,443,614	3,492,000	3,277,000	4,817,000	4,886,000	4,797,000
Lubricants—									
Atlantic intercoastal	37,112	40,709	32,312	43,127	73,000	79,000	68,000	51,000	46,000
Gulf intercoastal	593	88	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	13,507	14,494	17,880	15,665	9,000	2,000	4,000	3,000	1,000
Pacific foreign	1,667,316	1,230,532	1,045,128	1,203,520	623,000	502,000	485,000	504,000	374,000
Alaska and Hawaii	62,369	58,862	50,009	58,032	60,000	56,000	55,000	45,000	65,000
States outside Pacific Coast territory	224,906	167,812	136,327	146,461	123,000	58,000	43,000	37,000	39,000
Total	2,005,803	1,512,497	1,281,656	1,466,805	888,000	697,000	655,000	640,000	525,000
Other products—									
Atlantic intercoastal	687,260	504,261	491,349	418,069	348,000	516,000	133,000	139,000	91,000
Gulf intercoastal	376	.....	.....	.....	.....	.....	.....	72,000	77,000
Atlantic foreign	10,403	2,013	58,407	751,003	329,000	22,000	129,000	6,000	25,000
Pacific foreign	545,938	477,070	385,171	823,961	469,000	550,000	607,000	507,000	564,000
Alaska and Hawaii	28,551	21,677	52,189	27,223	26,000	20,000	24,000	26,000	82,000
States outside Pacific Coast territory	190,102	196,146	174,484	154,487	101,000	57,000	267,000	88,000	170,000
Total	1,462,630	1,201,167	1,161,600	2,174,743	1,273,000	1,165,000	1,160,000	838,000	1,009,000
Total all products—									
Atlantic intercoastal	6,675,729	8,204,628	5,341,278	5,873,375	7,992,000	9,695,000	24,628,000	20,117,000	11,512,000
Gulf intercoastal	73,707	265,821	81,960	55,701	.....	.....	91,000	903,000	247,000
Atlantic foreign	1,243,503	6,274,481	8,553,392	9,065,497	6,591,000	5,874,000	3,269,000	3,458,000	6,489,000
Pacific foreign	43,786,814	49,351,125	53,012,532	54,306,917	39,923,000	40,271,000	37,080,000	31,000,000	32,065,000
Alaska and Hawaii	7,312,203	5,818,453	4,954,355	5,509,310	5,297,000	4,863,000	4,628,000	3,939,000	4,210,000
States outside Pacific Coast territory	2,253,735	2,542,102	2,556,128	2,915,891	2,671,000	2,025,000	1,856,000	1,395,000	1,475,000
Total	61,345,691	72,456,610	74,499,645	77,726,691	62,474,000	62,728,000	71,552,000	60,812,000	56,098,000

effect, the government said, "You furnish the gasoline and we will supply the tanker." To the surprise of General officials, a short time later a government requisition came through for the company's tanker Mojave to take a cargo of gasoline to Russia. Because of this transaction General had to use tanker facilities of other marketers to keep the Pacific Northwest supplied.

The requisitioning of Pacific Coast boats is nearing the point where marketers will be soon unable to move their products to Pacific Northwest area due to lack of tankers. This is of special importance because consumption of gasoline and fuel oil on the Pacific Coast has reached a new high. It would be almost impossible to set up a rationing system so that only defense industries could secure their requirements because the program is broader than some think. In southern California practically all machine shops are manufacturing defense materials and the same situation exists in Washington and Oregon.

If the normal market of the California oil industry is further restricted, operators must severely reduce crude-oil production. The net result of such a program will be that many properties will be shut down with a resultant increase in unemployment and disruption of normal operations. It appears quite probable that California crude-oil production will be severely reduced during the coming winter period to offset decreased shipments to the Atlantic seaboard and the movement of crude and refined oil to Japan. The total of these losses approximates 50,000 bbl. daily. The amount involved changed from year to year in the past depending upon how much was purchased in the Gulf Coast, Mexico and the East Indies. It is obvious that if the normal Pacific Coast market is restricted by the withdrawal of tankers, additional curtailment will be necessary.

Pooling May Become Necessary

Just how many tankers ultimately will be requisitioned remains to be seen but if this reduction becomes critical it will be necessary to pool all transportation facilities. All South American and Panama Canal business is now beyond scope of California distributors due to lack of tankers. To date operators have been able to discharge small quantities of refined oil in the canal en route East when tankers are requisitioned.

Approximately 30 per cent of the Pacific Coast tanker fleet is detailed on special work through operation of lend-lease activities.

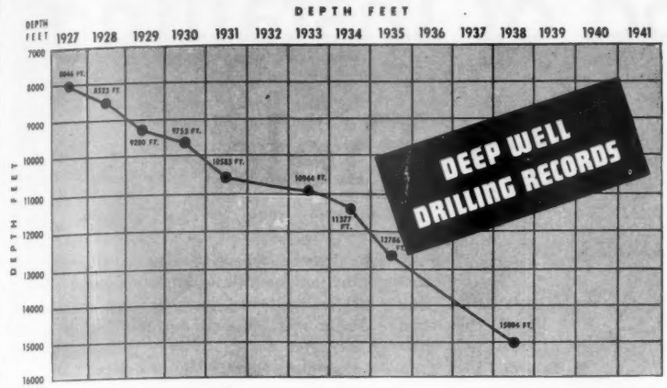
If the demand for petroleum products continues up through the coming winter, the Pacific Coast will experience the largest demand yet on record. Gasoline sales for the current year have been the largest ever recorded and each succeeding month has been substantially above the same period last year. August 1941 sales were 11.69 per cent above last year and September, October, November and December will probably also be higher than during 1940. The demand for fuel oil has reached such proportions that refiners have found it necessary to charge a much greater amount of crude oil to stills than would otherwise be the case in order to meet the demand. In addition, fuel-oil stocks have been consistently reduced for more than a year. Indications are that this condition will continue during the remainder of the year provided crude-oil production is curtailed. Refiners are reaching the point where they cannot keep on charging crude to stills to produce residual fuel because this causes a substantial increase in stocks of gasoline and diesel oil.

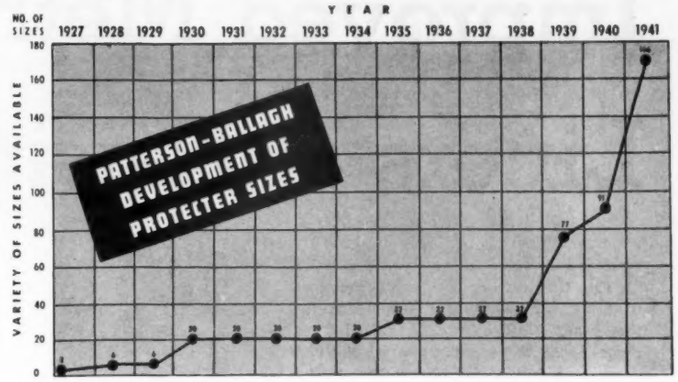
SHIPMENTS OF CALIFORNIA CRUDE AND REFINED OIL TO FOREIGN AND DOMESTIC PORTS
(Includes package goods)

	1941								
	January	February	March	April	May	June	July	August	Total 8 months
Crude—									
Atlantic intercoastal	.....	.....	.....	64,231	.....	.....	.....	.....	64,231
Atlantic foreign	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pacific foreign	1,029,785	786,025	1,419,652	835,759	1,614,623	1,167,842	1,064,186	378,519	8,296,391
States outside Pacific Coast territory	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,029,785	786,025	1,419,652	899,990	1,614,623	1,167,842	1,064,186	378,519	8,360,622
Gasoline—									
Atlantic intercoastal	299,027	196,101	504,635	364,769	394,993	490,881	79,774	290,164	2,620,344
Gulf intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	139	13	71	64,401	502	173	165	106	65,570
Pacific foreign	702,767	542,512	478,968	495,264	524,572	825,070	579,335	969,700	5,118,188
Alaska and Hawaii	3,344	216,824	183,362	272,093	(*)	(*)	(*)	(*)	675,623
States outside Pacific Coast territory	76,818	83,182	96,924	101,706	115,368	136,799	139,915	144,049	894,761
Total	1,082,095	1,038,632	1,263,960	1,298,233	1,035,435	1,452,923	799,189	1,404,019	9,374,496
Natural gasoline—									
Atlantic intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	.....	1,846	.....	603	.....	1,046	902	.....	4,397
Pacific foreign	55,422	50,542	244	50,381	45,722	2,227	14,583	39,475	258,596
Alaska and Hawaii	561	395	344	785	(*)	(*)	(*)	(*)	2,085
States outside Pacific Coast territory	1,263	1,188	941	951	1,639	1,079	1,264	1,022	9,347
Total	57,246	53,971	1,529	52,720	47,361	4,352	16,749	40,497	274,425
Fuel, diesel, and gas oil—									
Atlantic intercoastal	70,593	.....	.....	.....	.....	78,399	.....	53,508	202,500
Gulf intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	.....	.....	.....	14,865	.....	.....	.....	.....	14,865
Pacific foreign	1,915,843	642,182	1,211,948	1,427,121	2,049,621	2,069,929	1,258,474	1,274,743	11,849,861
Alaska and Hawaii	27,456	498,606	488,882	635,857	(*)	(*)	(*)	(*)	1,650,801
States outside Pacific Coast territory	45,476	39,122	55,458	46,945	38,351	49,350	36,264	36,916	347,882
Total	2,059,368	1,179,910	1,756,288	2,124,788	2,087,972	2,119,279	1,294,738	1,365,167	14,065,909
Kerosene—									
Atlantic intercoastal	.....	.....	.....	10,413	.....	.....	.....	22,714	33,127
Gulf intercoastal	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic foreign	.....	.....	74,481	4,557	.....	.....	.....	.....	79,038
Pacific foreign	21,153	21,075	9,804	36,443	43,281	59,233	7,757	4,159	202,905
Alaska and Hawaii	1,655	641	18,028	18,523	(*)	(*)	(*)	(*)	38,847
States outside Pacific Coast territory	2,467	3,002	2,311	1,637	2,076	1,096	2,235	1,169	15,993
Total	25,275	24,718	104,624	71,573	45,357	60,329	9,992	28,042	369,910
Lubricants—									
Atlantic intercoastal	1,115	780	4,478	973	1,834	2,138	189	17	11,524
Gulf intercoastal	191	.....	191	.....	80	.....	.....	.....	462
Atlantic foreign	146	28	8,347	998	50	2,237	326	1,493	13,625
Pacific foreign	178,285	77,283	41,863	201,545	204,969	194,941	124,106	101,357	1,124,349
Alaska and Hawaii	5,476	6,160	4,259	8,894	(*)	(*)	(*)	(*)	24,790
States outside Pacific Coast territory	16,091	12,856	19,113	25,172	19,816	21,775	21,030	25,560	161,413
Total	201,304	97,107	78,251	237,582	266,749	221,091	145,651	128,427	1,336,162
Other products—									
Atlantic intercoastal	.....	62	.....	.....	.....	247	25	.....	334
Gulf intercoastal	.....	.....	.....	.....	.....	119	.....	.....	119
Atlantic foreign	65	103	.....	121	.....	.....	94	750	1,113
Pacific foreign	31,398	31,835	23,951	100,899	69,246	76,661	49,298	80,107	463,395
Alaska and Hawaii	2,631	10,325	8,050	52,185	(*)	(*)	(*)	(*)	73,191
States outside Pacific Coast territory	2,916	4,245	9,765	10,115	11,882	18,733	39,169	37,232	134,057
Total	37,010	46,570	41,766	163,320	81,128	95,760	88,586	118,089	672,229
Total all products—									
Atlantic intercoastal	370,735	196,943	509,113	440,376	396,827	571,665	79,988	366,403	2,932,050
Gulf intercoastal	191	.....	191	85,545	80	119	.....	.....	86,126
Atlantic foreign	350	1,990	82,899	.....	552	3,456	1,487	2,349	93,083
Pacific foreign	3,934,653	2,151,454	3,186,430	3,147,422	4,552,034	4,395,903	3,097,739	2,848,060	27,313,695
Alaska and Hawaii	41,123	732,951	702,925	988,337	(*)	(*)	(*)	(*)	2,465,336
States outside Pacific Coast territory	145,031	143,595	184,512	186,526	189,132	228,832	239,877	245,948	1,563,453
Total	4,492,083	3,226,933	4,666,070	4,848,206	5,138,625	5,199,975	3,419,091	3,462,760	34,453,743

*Segregation discontinued by Bureau of Mines—now included in Pacific foreign shipments.

The deeper the wells, the greater the service





As the years roll on,

wells go deeper and Patterson-Ballagh Products are developed in keeping with greater drilling demands. The range of Protector sizes has been constantly increased. New Products have been added after exhaustive field tests. Since 1927 Patterson-Ballagh progress has aided deep drilling in innumerable ways. Many drilling operators have standardized upon these products with resultant savings that have more than paid initial costs again and again.

BEFORE 1927

1. Case wore through, allowing water to enter, cutting life of well or causing collapsation.
2. Collars and tool joints wore rapidly.
3. Drill pipe had premature fatigue.
4. Crooked drill pipe, a frequent trouble.
5. Slow drilling speeds necessary.
6. Excessive power needed to rotate.
7. Kellys frequently bent.
8. Equipment had short life.
9. Cost of drilling, excessive.
10. Wells of great depth not commercially practicable.

AFTER 1927

1. Worn casing no problem, by use of Protectors.
2. Collars and tool joints show no wear.
3. Drill pipe has far longer life.
4. Crooked pipe a thing of the past, when Stabilizers are used.
5. Speeds of 500 r.p.m., common as compared with old speeds of 150 to 175.
6. Almost all power transmitted to bit.
7. Protectors or Stabilizers prevent Kelly bending.
8. Smoother drilling adds life to equipment.
9. Cheaper drilling costs less per foot.
10. Wells drilled to 15,000 feet or more now possible.

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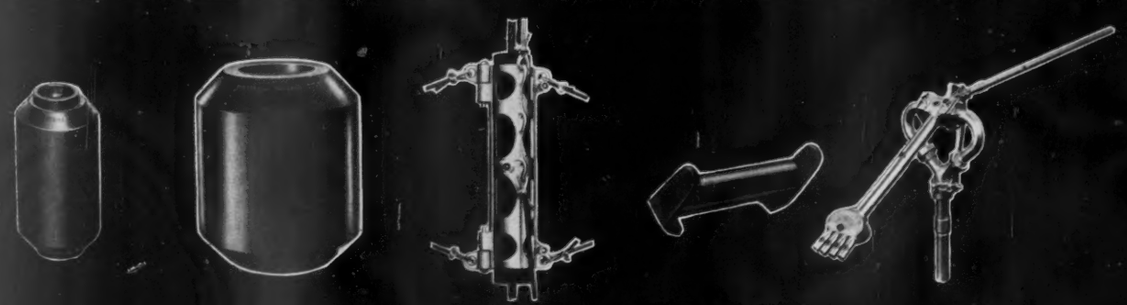
still continues



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Improved Method of Installing Liners at Raisin City Field

By T. P. SANDERS

THE Raisin City field, discovered by Shell Oil Co., Inc., during the past summer, is conceded to be California's most important discovery of the year. Not only does it bolster the state's reserves in a period when discoveries have become rare, but it also opens up a new wildcatting area, being located 25 miles farther north than any previous oil discovery in the state.

Uncertainty surrounded the discovery during most of the summer. The first well (8-18 Properties, Inc.) was primarily a gasser, having been completed the last of May for a production of 5,000,000 cu. ft. of gas and 24 bbl. of oil per day. The second well (1-19 Santa Ana and Fresno Land Co.) reached its total depth in good time by the end of June and flowed at the rate of 100 bbl. per hour on an 11-minute formation test. But in spite of this excellent showing, the well defied successful completion for more than a month.

The story behind this month of uncertainty, culminating in the successful application of a completion method new to California, is one of unusual interest. Now, another well (28-18 Properties, Inc.) has been completed by Shell using the same successful process, but this time in routine manner, since all necessary experimenting was consummated on the previous completion.

Severe Sand Conditions

Unlike most California fields, the Raisin City discovery exhibits very severe sand conditions. For years virtually all wells in the state have been completed simply by hanging a slotted liner through the productive zone, or by setting the liner on bottom if it is less than 100 ft. long. Save for the periodic necessity of bailing sand out of the liner, this practice has been successful, the notable exception being the Wilmington field, where gravel-packed liners were adopted out of necessity for wells completed in the Ranger and Upper Terminal zones.

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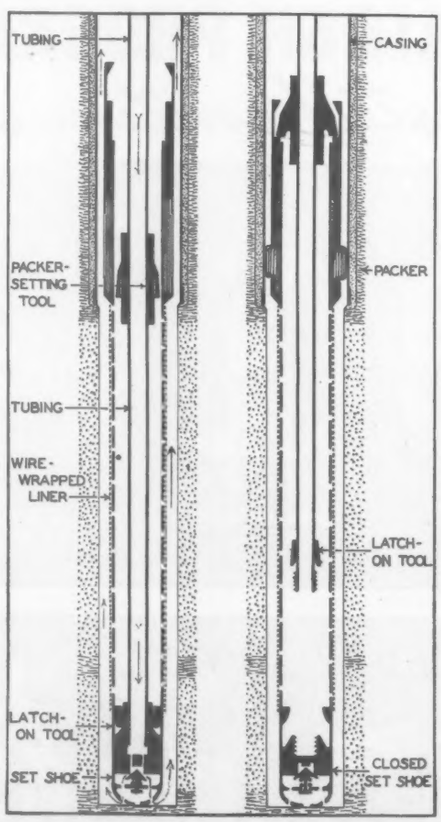

Generalized schematic views showing arrangement used for running wire-wrapped liner on tubing so that the well can be washed, packer expanded, and tubing hung under pressure without removing string from hole

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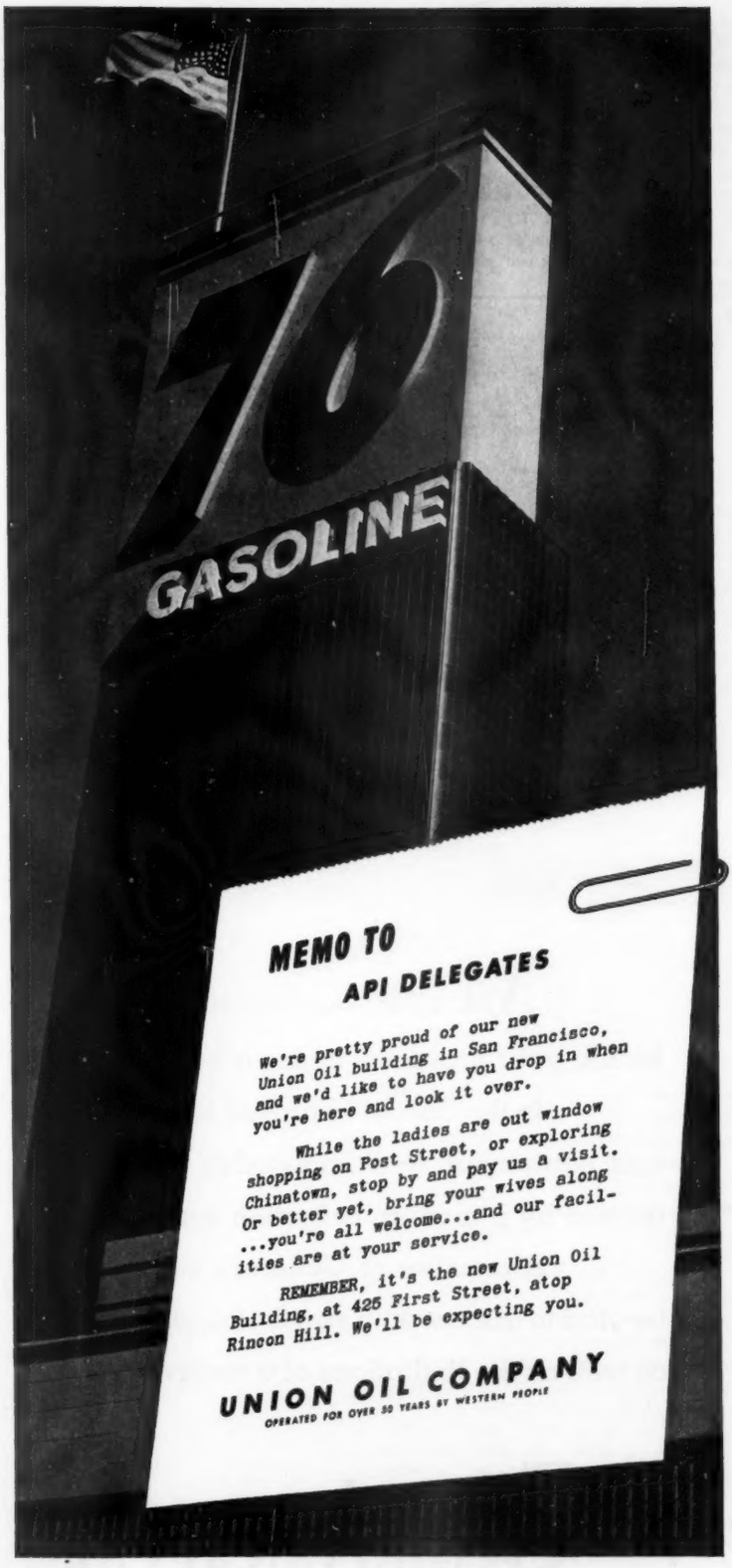
76
GASOLINE
MEMO TO
API DELEGATES
We're pretty proud of our new Union Oil building in San Francisco, and we'd like to have you drop in when you're here and look it over.
While the ladies are out window shopping on Post Street, or exploring Chinatown, stop by and pay us a visit. Or better yet, bring your wives along ...you're all welcome...and our facilities are at your service.
REMEMBER, it's the new Union Oil Building, at 425 First Street, atop Rincon Hill. We'll be expecting you.
UNION OIL COMPANY
OPERATED FOR OVER 50 YEARS BY WESTERN PEOPLE

Improved Method of Installing Liners at Raisin City Field

By T. P. SANDERS

THE Raisin City field, discovered by Shell Oil Co., Inc., during the past summer, is conceded to be California's most important discovery of the year. Not only does it bolster the state's reserves in a period when discoveries have become rare, but it also opens up a new wildcatting area, being located 25 miles farther north than any previous oil discovery in the state.

Uncertainty surrounded the discovery during most of the summer. The first well (8-18 Properties, Inc.) was primarily a gasser, having been completed the last of May for a production of 5,000,000 cu. ft. of gas and 24 bbl. of oil per day. The second well (1-19 Santa Ana and Fresno Land Co.) reached its total depth in good time by the end of June and flowed at the rate of 100 bbl. per hour on an 11-minute formation test. But in spite of this excellent showing, the well defied successful completion for more than a month.

The story behind this month of uncertainty, culminating in the successful application of a completion method new to California, is one of unusual interest. Now, another well (28-18 Properties, Inc.) has been completed by Shell using the same successful process, but this time in routine manner, since all necessary experimenting was consummated on the previous completion.

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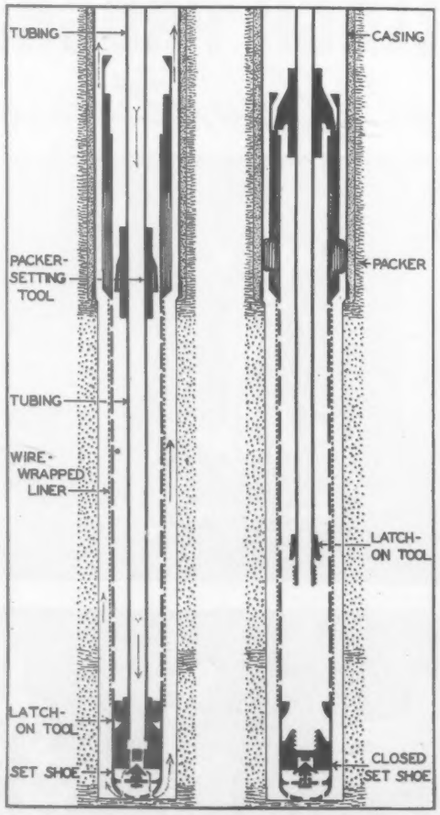

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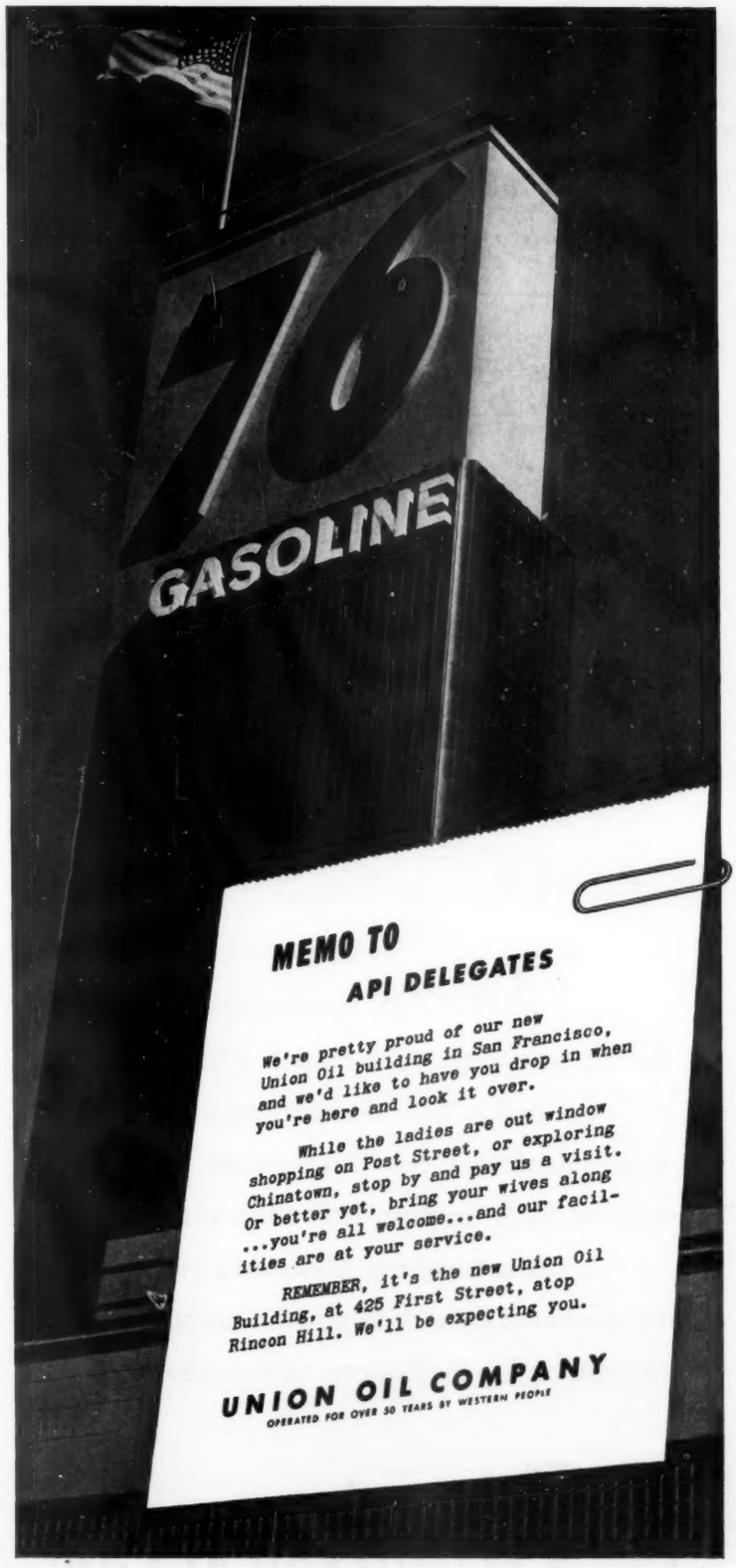
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MEMO TO
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We're pretty proud of our new Union Oil building in San Francisco, and we'd like to have you drop in when you're here and look it over.
While the ladies are out window shopping on Post Street, or exploring Chinatown, stop by and pay us a visit. Or better yet, bring your wives along ...you're all welcome...and our facilities are at your service.
REMEMBER, it's the new Union Oil Building, at 425 First Street, atop Rincon Hill. We'll be expecting you.
UNION OIL COMPANY
OPERATED FOR OVER 50 YEARS BY WESTERN PEOPLE

Voluntary Crude-Oil Curtailment In California Effective

(Continued from Page 46)

all classes of operators are assured of representation while all terms of office automatically expire each spring with the annual elections of district chairmen to constitute the new committee.

During the 12-year history of organized voluntary conservation in California, several different methods of prorating production of oil to within reasonable limits of market demand have been in vogue at different times, the present method being the fruit of many preceding trial-and-error attempts, plus many thousands of man-hours of concentrated thought. The newer methods have been developed as inequities in older methods have been recognized; the 12 years of experience in proration has resulted in progress in methods and in the discovery of fundamental principles not at first noted.

The uniform formula, adopted in 1939 and still in effect except for such modifications as field developments, new discoveries of oil, changes in market demand and in economic conditions have made necessary, is the engineers' answer to the problems posed by the industry, speaking through the fact-finding and emergency executive committees, in the winter of 1938-39. It recognizes the marginal well; it recognizes that a prolific flowing well can bear a greater percentage of curtailment than can a small, settled well; it recognizes that there is a maximum limit more than which no well should produce.

With the minimum depth allowable, the marginal well is permitted to produce without restriction. The Conservation Committee designates the marginal well as one whose potential is less than the total exemption provided under the minimum formula for the particular depth, the exemption itself having been developed after consideration of several factors. The most important of these is the average lifting cost, which is relatively high on a per-barrel basis since all of these wells are pumpers, so that the exemption provides a "living wage" for many wells which otherwise would be forced off production with the resultant loss of reserves.

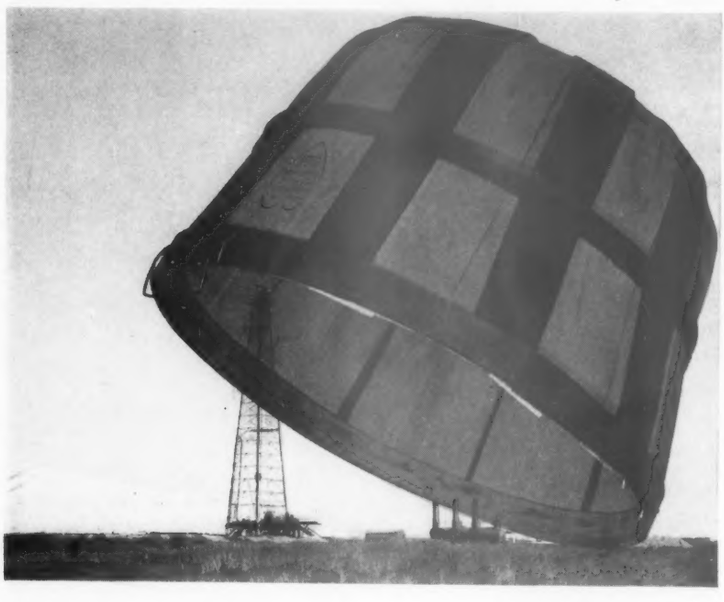
The minimum-allotment provision of the uniform formula gives each well not less than 10 bbl. per day, if it is capable of that amount of production, and in addition gives each well an allotment based on depth. The depth minimum now provides for an allotment of 5 bbl. for the first 1,000 ft. of depth; 5 bbl. plus 0.75 bbl. for the second 1,000 ft.; 5.75 bbl. plus 0.75 bbl. or 6.50 bbl. for the third 1,000 ft., and so on. In the actual application of the depth minimum, fractions are discarded and whole numbers are used, a table being constructed so that the wells within a given depth range receive the same minimum. For example, a well at 5,583 ft. would receive 37.5 bbl. per day under the formula, while one at 5,695 ft. would receive 38.5. The tables gives wells between these two depths 38-bbl. minimum allotments.

Sliding-Scale-Percentage Curtailment

The second step in the formula is commonly known as the sliding-scale-percentage curtailment, and is the curtailment applied to the potential remaining after the minimum allotment is deducted. This curtailment is applied to all intermediate wells, which are defined as those wells falling between marginal and top classifications, on the same principle as that of income taxation, namely: that the percentage of curtailment increases as the production increases, on the theory that prolific wells are best able to bear the burden of curtailment, as wealthy individuals are of taxation. This method is a refinement of the straight percentage method and avoids the tendency of the latter method to allocate a disproportionate share of the total allotment to flush wells.

The third step in the uniform formula is the application of the top allowable, which is arbitrarily set by the committee at its monthly meetings, and which has been reduced from 250 bbl. per well in June 1939, when the formula went into effect, to 143 bbl. in October 1941. This allotment is given to each well capable of earning it under the formula.

While the uniform formula thus briefly outlined is in effect today and has been for nearly 2½ years, there is, of course, no guarantee it will remain in effect for any specified length of time in the future. Obviously, the federal Government is exercising more influence over the oil industry at the present time than it has in the past; the extent and character of that influence in the future cannot be estimated at this time, nor can its effect be gaged on the California conservation program. There is also the fact that even if the federal Government should entirely withdraw from its present position, the voluntary program would still be subject to change, just as it has been throughout its 12-year lifetime, as new factors make themselves felt, and as additional experience dictates modifications in methods. In the past, the fluidity of the voluntary program in the state has been its strength, as the utter lack of authority to enforce compliance with allocations has been its weakness. Operators have seen changes made to give more equitable results, these changes themselves demonstrating the good faith of those who have, from time to time, been the administrators of the program, and making it possible for them to achieve the degree of success that has been accomplished.



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New Method of

Washing Gravel-Packed Liners In Wilmington Completions

By T. P. SANDERS

DURING recent years the Wilmington field of California has contributed more to the development of new well-completion practices than any other field. It was here that the three-zone completion was devised, making it possible to flow three zones simultaneously in the same well under different back pressures without mixing the production. Such measures as the use of prepacked gravel liners were also developed here, while many uses for drillable alloys were perfected in overcoming problems of the field.

One of the latest advancements to be credited to the Wilmington field is a new method of washing prepacked or slotted liners. The method was developed by Benton Turner and L. T. Taylor, of Drilling & Exploration Co., and is known locally as the Taylor perforation washer. Washing fluid is pumped down from the surface, emerging from the washing tool at a point between two opposed swab rubbers which are usually spaced 1 ft. apart so that the entire flow of fluid can be forced through a selected interval of the liner. A recording pressure gage at the surface shows how much pressure is required to force fluid through any given set of perforations, thereby showing when the liner has been sufficiently cleaned and also providing a check on the liner setting.

In order to show how the liner-washing method and other newly established measures fit into the general scheme of well completion, the completion program as carried on by one of the largest operators in the Wilmington field will be set forth.

Wilmington Completion Practice

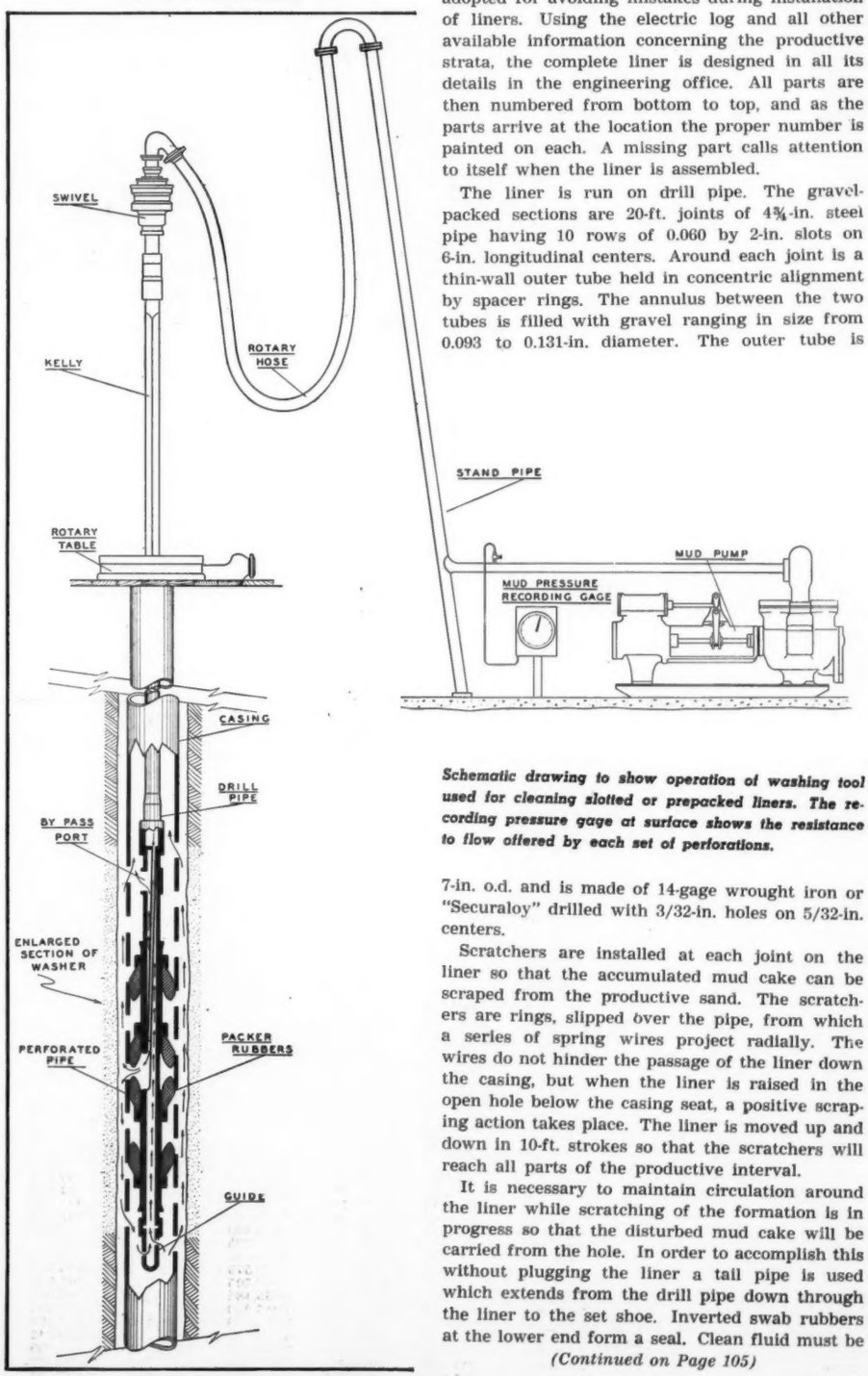
Three general types of well completion are used, each to suit a different type of well. The wells that are directionally drilled use prepacked gravel liners if they are completed in the Ranger zone or the upper Terminal zone or in both. A great many wells in the Wilmington field are drilled directionally, not only because of the harbor, the many industrial properties, or other surface conditions, but also because of faults. At the depth of the oil zones there is an intricate system of block faulting and the larger faults have been quite well defined by electric logs. When a fault plane is crossed, it is common practice to deflect the bit so that it will follow a course close to the fault, thereby opening up strata that might not be drained otherwise. This practice, which seems to be peculiar to this field, accounts for much of the directional drilling.

Wells that are drilled vertically and completed in the Ranger or upper Terminal zones, or both, are packed with gravel which is pumped in around the liner by reverse circulation. This method was originally described in The Oil and Gas Journal, October 14, 1937, Page 59.

Wells completed in the lower Terminal zone or the Ford zone use slotted liners without gravel since these zones, unlike the Ranger and upper Terminal zones, are not troublesome because of sand production.

A regular engineering procedure has been adopted for avoiding mistakes during installation of liners. Using the electric log and all other available information concerning the productive strata, the complete liner is designed in all its details in the engineering office. All parts are then numbered from bottom to top, and as the parts arrive at the location the proper number is painted on each. A missing part calls attention to itself when the liner is assembled.

The liner is run on drill pipe. The gravel-packed sections are 20-ft. joints of 4¾-in. steel pipe having 10 rows of 0.060 by 2-in. slots on 6-in. longitudinal centers. Around each joint is a thin-wall outer tube held in concentric alignment by spacer rings. The annulus between the two tubes is filled with gravel ranging in size from 0.093 to 0.131-in. diameter. The outer tube is 7-in. o.d. and is made of 14-gage wrought iron or "Securaloy" drilled with 3/32-in. holes on 5/32-in. centers.



Schematic drawing to show operation of washing tool used for cleaning slotted or prepacked liners. The recording pressure gage at surface shows the resistance to flow offered by each set of perforations.

Scratchers are installed at each joint on the liner so that the accumulated mud cake can be scraped from the productive sand. The scratchers are rings, slipped over the pipe, from which a series of spring wires project radially. The wires do not hinder the passage of the liner down the casing, but when the liner is raised in the open hole below the casing seat, a positive scraping action takes place. The liner is moved up and down in 10-ft. strokes so that the scratchers will reach all parts of the productive interval.

It is necessary to maintain circulation around the liner while scratching of the formation is in progress so that the disturbed mud cake will be carried from the hole. In order to accomplish this without plugging the liner a tail pipe is used which extends from the drill pipe down through the liner to the set shoe. Inverted swab rubbers at the lower end form a seal. Clean fluid must be

(Continued on Page 105)

CALIFORNIA CRUDE-OIL PRODUCTION

San Joaquin Valley

Year	Arvin	Belridge	Canal	Canfield Ranch	East & West Coalinga	Northeast Coalinga	Southeast Coalinga	Coles Levee	Edison	Elk Hills	Fruitvale	Greeley	Kern River	Kettleman Middle Dome
1896					14,119									
1897					70,140									
1898					154,000									
1899					439,372									
1900					547,960								826,775	
1901					525,433								3,278,840	
1902					571,233								8,988,046	
1903					2,138,058								16,342,099	
1904					5,097,853								17,226,240	
1905					8,882,125								15,253,845	
1906					8,401,105								12,825,166	
1907					8,996,268								12,346,014	
1908					10,725,795								13,803,579	
1909					15,406,619								14,508,242	
1910					18,646,570								14,776,435	
1911					18,311,251								14,078,890	
1912		1,351,817			19,546,122								12,446,445	
1913		2,144,822			18,604,626								9,980,940	
1914		1,491,825			15,925,887								7,030,545	
1915		1,221,520			13,567,380								8,094,673	
1916		1,325,057			14,393,437								8,539,973	
1917		2,011,051			15,898,912								8,593,034	
1918		1,815,537			16,360,225								8,060,256	
1919		1,559,689			16,408,829					281,019			7,630,937	
1920		1,438,358			15,697,035					7,275,809			7,457,810	
1921		1,022,751			12,522,157					18,085,425			6,700,420	
1922		817,317			9,159,368					11,891,030			7,317,288	
1923		270,239			5,210,839					8,174,371			6,816,134	
1924		383,387			10,144,428					13,589,611			6,773,321	
1925		679,584			7,751,107					11,971,149			5,901,877	
1926		700,555			7,295,807					12,292,754			4,312,171	
1927		483,967			7,154,599					10,073,073			6,098,582	
1928		625,703			4,655,284					8,107,198	133,433		5,071,284	
1929		751,497			3,558,843					6,353,035	594,498		6,089,344	
1930		1,035,830			3,373,078					6,572,379	903,337		5,349,915	
1931		2,761,115			2,978,392					4,925,636	867,719		3,857,474	
1932		3,018,361			3,649,578					4,537,461	1,600,801		3,387,262	10,537
1933		2,863,357			4,423,512					4,487,978	1,672,805		3,210,010	151,979
1934		2,918,295			6,594,950				135,792	3,345,772	1,342,724		3,704,447	127,998
1935		3,629,367			7,249,417				979,269	3,216,318	1,847,528		4,518,109	38,515
1936		4,648,261			6,067,079				2,023,451	3,194,445	2,902,620	3,960	5,162,724	137,630
1937		6,331,704	31,575		5,759,019				1,576,471	3,787,052	3,246,164	527,644	5,639,344	49,464
1938		5,312,264	849,154	35,111	3,651,362		246,217	10,345	1,102,525	3,886,718	3,078,492	1,163,873	4,589,655	19,539
1939	445,676	4,781,217	1,854,658	21,633	3,358,497	183,679	2,188,397	336,018	837,884	3,829,940	2,376,587	811,206	4,132,754	8,829
1940	646,548	4,613,658	2,033,770	15,764	3,777,210	1,667,594	4,470,988	1,329,813	868,300	4,427,223	2,071,914	1,475,378	4,081,861	
Jan.-Aug. 1941	178,496	2,929,331	1,227,359	10,534	2,869,203	2,091,192	4,050,796	1,398,113	703,032	2,661,120	1,338,035	1,512,500	2,654,402	
Total	1,270,720	64,937,436	5,995,516	83,042	366,534,082	3,942,465	10,956,398	3,074,289	8,226,724	156,966,516	23,976,657	5,494,561	327,457,162	544,491

Coastal District

Year—	Aliso Canyon	Capitan	Elwood	Gato Ridge	Newhall-Potrero	Padre Canyon	Rincon	San Miguelito	Santa Barbara	Santa Maria	Santa Maria Valley	Summer-land	Ventura Avenue	Ventura-Newhall*
1894												1,800		570,469
1895												16,904		474,624
1896												39,792		298,866
1897												130,136		631,135
1898												132,217		763,871
1899												208,370		743,998
1900												183,486		628,734
1901												203,616		495,943
1902										94,188		136,252		646,496
1903										204,890		131,125		682,185
1904										700,450		120,506		650,779
1905										3,402,800		96,871		476,898
1906										4,799,411		72,810		404,379
1907										8,249,236		69,060		435,584
1908										8,699,350		67,862		498,015
1909										8,017,455		66,338		516,628
1910										7,607,830		74,725		652,575
1911										7,465,074		71,255		661,785
1912										6,801,966		65,715		859,885
1913										5,817,711		62,406		1,022,052
1914										4,303,080		55,743		968,421
1915										4,466,200		55,800		1,028,106
1916										4,342,605		53,500	2,650	1,083,635
1917										5,956,057		54,000	7,100	1,129,817
1918										7,180,174		54,000	23,609	1,373,213
1919										6,055,448		54,000	38,435	1,734,762
1920										5,782,426		54,000	105,185	1,944,630

Los Angeles Basin

Year—	Brea Olinda	East Coyote	West Coyote	Dominguez	El Segundo	Huntington Beach	Inglewood	Lawndale	Long Beach	Los Angeles-Salt Lake	Montebello
1894										196,094	
1895										749,695	
1896										902,868	
1897	12,000									1,064,158	
1898	69,000									1,126,000	
1899	217,599									1,052,036	
1900	511,550									1,280,000	
1901	753,198									1,830,000	
1902	1,103,793									2,027,000	
1903	1,552,893									793,765	
1904	1,520,101									1,241,304	
1905	1,515,737									2,226,768	
1906	1,792,767									2,675,650	
1907	2,410,200		64,000							3,372,465	
1908	3,308,604		91,500							5,138,959	
1909	4,213,723		95,744							4,350,898	
1910	5,082,961		350,220							3,729,618	
1911	6,011,915		252,522							3,223,661	
1912	5,813,037	980,213	379,090							3,073,427	
1913	6,189,561	1,626,641	2,150,718							2,898,846	
1914	6,495,100	2,289,482	4,708,177							2,504,475	
1915	5,505,999	2,769,494	3,841,014							2,094,194	
1916	4,806,104	3,307,455	5,281,244							1,729,761	
1917	4,527,875	3,337,463	8,121,008							1,453,161	789,635
1918	4,361,751	2,911,728	9,702,870							1,347,471	6,839,267
1919	4,349,376	2,304,042	7,936,317							1,323,021	12,100,784
1920	5,237,044	1,987,182	6,745,253			38,116				1,320,573	11,124,585
1921	5,962,008	1,839,441	5,579,609			2,518,812			75,588	1,314,213	9,065,723
1922	4,512,974	1,400,081	5,600,292			11,169,383			18,560,595	1,258,287	6,692,024
1923	4,064,661	864,615	1,583,210	157,698		34,355,642			68,810,361	1,192,036	4,075,669
1924	4,120,789	2,008,902	3,674,657	6,811,531		17,533,520	10,445		60,122,002	907,453	6,230,299
1925	4,481,443	1,256,089	5,883,915	13,328,817		15,887,474	18,348,395		40,173,375	731,912	6,843,194
1926	6,987,489	753,584	5,277,035	7,801,586		19,064,814	17,390,131		37,931,964	675,950	6,515,493
1927	7,008,934	881,151	4,265,713	5,887,645		26,344,697	12,751,556		34,541,667	630,600	5,498,252
1928	5,743,044	800,051	4,101,947	4,267,009		19,642,278	10,762,797	15,686	62,467,103	560,607	4,369,638
1929	4,813,942	674,522	3,501,513	3,606,850		16,007,030	8,768,101	392,533	60,495,555	552,614	3,657,922
1930	4,423,266	625,331	3,264,716	3,694,075		11,108,203	6,429,205	130,472	36,599,688	545,959	2,712,725
1931	3,626,008	597,159	3,154,698	4,183,052		7,778,549	5,289,125	121,670	30,166,409	464,564	2,446,052
1932	3,018,125	585,951	3,130,516	6,823,579		8,016,001	4,869,335	110,350	27,435,553	394,124	2,162,530
1933	2,964,674	573,769	3,124,603	6,626,605		13,091,926	4,059,973	79,460	24,798,242	313,810	1,933,121
1934	3,744,538	907,334	3,236,702	6,655,465		15,106,268	3,376,586	53,640	23,067,025	289,154	1,980,942
1935	3,611,804	986,705	3,553,712	7,915,850		15,133,293	4,477,004	64,196	26,562,848	292,123	2,287,385
1936	2,960,753	909,646	3,033,973	9,712,179	149,149	13,247,499	4,546,727	49,307	24,994,299	303,778	3,204,714
1937	2,658,561	1,382,236	2,886,355	9,838,787	3,632,177	13,254,242	5,530,095	31,662	21,871,458	250,522	3,166,947
1938	2,124,838	1,264,089	3,089,884	9,756,119	3,872,044	11,916,950	5,337,308	28,790	20,598,714	196,304	4,146,724
1939	2,062,951	941,883	3,070,941	7,130,594	1,168,183	9,983,160	4,605,242	19,175	17,003,310	189,804	7,454,768
1940	2,070,210	1,385,650	2,667,014	7,665,156	784,946	9,592,134	4,365,975	14,738	16,009,359	194,684	7,239,982
Jan.-Aug. 1941	1,374,602	909,413	2,038,508	5,631,711	361,889	7,103,834	3,022,921	7,444	9,975,106	131,528	3,422,149
Total	159,688,502	43,061,302	125,440,190	127,494,308	9,968,388	297,893,825	123,940,921	1,119,123	662,260,221	66,115,894	125,960,524

FROM 1894 TO DATE—IN BARRELS

San Joaquin Valley

Year	Kettleman North Dome	Lost Hills	McKittrick	Midway-Sunset	Mountain View	Mount Poso	Paloma	Rio Bravo	Round Mountain	Strand	Ten Section	Tupman	Wasco	Wheeler Ridge
1898			10,000											
1899			15,000											
1900			80,000	12,500										
1901			430,450	192,835										
1902			619,296	170,606										
1903			1,353,206	379,870										
1904			1,856,225	391,335										
1905			1,373,030	437,742										
1906			680,756	319,350										
1907			2,415,840	854,749										
1908			3,076,300	1,898,088										
1909			5,807,360	4,234,156										
1910		4,900	5,471,613	20,393,111										
1911		168,410	5,477,532	27,143,671										
1912		1,329,144	5,094,465	31,539,804										
1913		3,129,731	4,496,842	39,024,780										
1914		3,339,096	3,820,857	50,025,843										
1915		3,088,956	3,585,899	39,621,003										
1916		3,548,444	3,347,166	39,172,871										
1917		4,348,370	3,275,529	37,094,435										
1918		3,647,320	3,060,572	34,831,580										
1919		3,101,322	2,837,324	32,198,593										
1920		2,720,201	2,600,763	30,656,596										
1921		2,238,180	2,070,369	28,773,388										
1922		1,997,507	2,417,434	29,694,842										
1923		1,573,244	2,191,702	27,803,281										128,674
1924		1,142,984	2,094,598	37,464,889										342,357
1925		1,050,556	2,091,971	36,923,402										344,760
1926		993,111	1,961,028	33,968,755		46,225								371,981
1927		1,031,333	1,855,603	31,670,708		40,277			8,700					374,734
1928	199,699	900,788	1,805,485	27,314,093		53,977			44,455					329,485
1929	1,951,786	850,928	1,708,520	25,310,976		1,826,056			223,734					250,156
1930	6,209,357	277,645	1,489,628	23,487,147		3,883,924			1,194,832					219,237
1931	17,544,824	222,634	903,722	18,728,461		3,009,374			245,426					192,897
1932	21,949,072	311,623	651,792	17,929,036		2,907,839			928,814					187,299
1933	21,472,041	342,516	651,361	17,541,812	233,341	3,050,826			1,118,913					168,918
1934	21,265,884	1,472,794	1,105,618	19,712,566	2,609,017	3,486,217			1,808,322					156,204
1935	27,568,302	1,761,978	1,393,985	20,239,798	9,228,891	5,539,888			2,327,151					152,846
1936	29,148,997	1,346,757	777,420	21,481,621	9,712,658	6,747,210			3,955,379		188,464			128,962
1937	29,083,428	1,414,251	1,307,850	26,484,913	6,842,766	6,676,914		127,834	4,834,772		932,428			118,620
1938	25,589,925	1,297,497	1,288,745	22,875,370	4,032,837	6,234,882		1,944,578	5,473,906		2,472,779	1,668	125,063	113,036
1939	19,559,177	1,222,238	1,325,929	18,960,497	2,983,263	4,314,314	23,207	2,875,405	3,527,715	134,508	3,246,815	190,401	402,238	124,520
1940	16,729,502	1,405,339	1,316,775	18,397,393	2,414,878	3,424,980	129,878	3,303,835	2,691,430	527,621	3,518,036	1,259,156	570,216	112,883
Jan.-Aug. 1941	9,392,850	831,431	915,942	11,544,345	1,306,001	2,463,822	33,033	2,925,162	1,859,198	346,341	3,314,659	2,408,097	420,900	69,868
Total	247,664,844	52,111,228	92,111,502	906,900,811	39,363,652	53,706,725	186,118	11,176,814	30,242,747	1,008,470	13,673,181	3,859,322	1,518,417	3,887,437

Raisin City—Jan.-Aug. 1941, 9,275; total, 9,275. Union Avenue—Jan.-Aug. 1941, 29,961; total, 29,961.

Coastal District

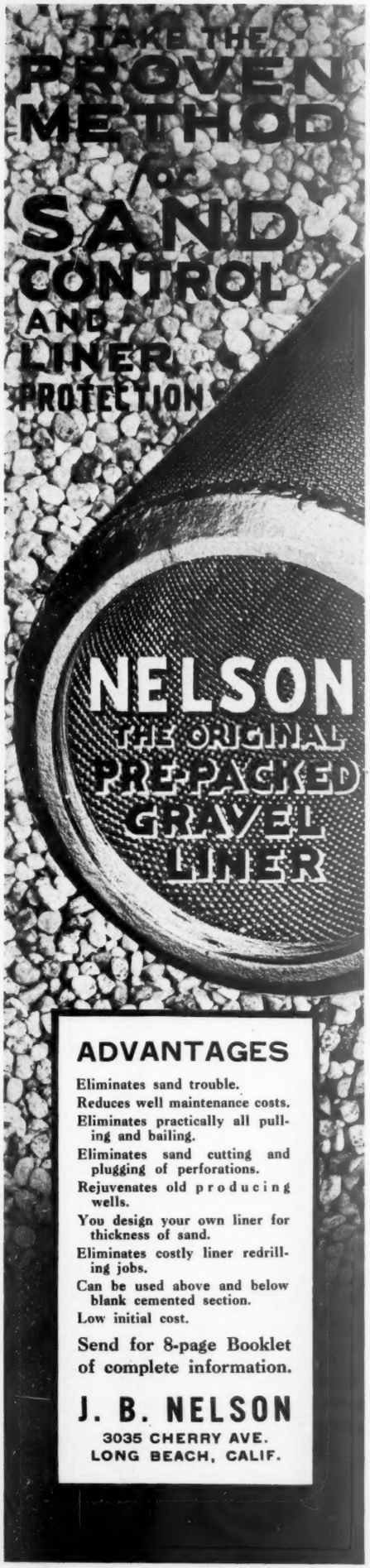
Year—	Aliso Canyon	Capitan	Elwood	Gato Ridge	Newhall-Potrero	Padre Canyon	Rincon	San Miguelito	Santa Barbara	Santa Maria	Santa Maria Valley	Summerland	Ventura Avenue	Ventura-Newhall*
1921										5,465,262		54,000	127,674	1,975,473
1922										3,797,903		48,339	685,247	2,330,630
1923										3,003,672		52,862	1,423,187	2,279,217
1924										2,857,495		53,201	1,831,903	2,188,266
1925										2,596,581		48,351	6,999,403	2,264,069
1926										1,852,356		46,865	14,795,495	2,204,381
1927							5,923			1,999,051		49,475	17,808,704	2,197,644
1928			849,886				1,082,735			2,041,499		44,853	18,920,942	2,096,343
1929		2,795	9,431,774				1,192,237		10,868	1,535,815		93,826	20,934,388	1,856,706
1930		25,295	14,606,007				1,003,204		12,851	1,152,893		118,042	17,493,155	1,772,131
1931		53,183	10,470,056	2,000			710,178	24,249	110,880	1,013,205		59,115	15,255,256	1,325,625
1932		3,092	5,441,626				628,179	252,247	156,446	1,080,723		39,386	12,332,853	1,259,755
1933		24,621	4,918,488				680,471	390,559	249,426	1,254,818		31,434	12,576,208	1,199,997
1934		194,414	4,113,644	32,497			540,886	268,643	598,165	1,771,601	2,008	20,039	9,882,614	1,400,039
1935		521,528	4,559,588	4,722			669,826	296,286	1,144,088	1,526,648		14,499	10,979,450	1,472,471
1936		570,727	4,478,732	155,113		107,311	754,218	472,859	503,939	1,444,047	69,014	12,906	12,609,878	1,699,905
1937		918,351	3,203,137	664,923	37,755	371,127	1,057,855	775,379	247,444	1,598,114	1,629,696	12,150	12,685,048	1,793,549
1938	23,418	1,066,655	2,247,430	1,470,837	241,501	252,786	1,394,626	791,246	160,347	1,201,572	3,455,889	11,705	12,925,543	1,637,699
1939	205,216	876,022	1,545,512	913,045	395,260	200,970	1,237,717	751,109	111,084	1,267,745	4 123,944	10,286	12,935,150	1,716,542
1940	527,762	650,858	1,286,146	883,331	614,734	233,316	1,609,319	929,755	84,112	1,332,644	6,096,086	8,434	12,569,511	1,691,978
Jan.-Aug. 1941	688,156	481,875	785,874	867,787	602,883	233,914	1,066,900	713,812	52,489	1,080,355	4,532,271	3,081	8,376,283	1,041,419
Total	1,444,552	5,389,416	67,937,900	4,994,255	1,892,133	1,399,424	13,634,274	5,666,144	3,442,139	140,820,350	19,908,888	3,165,138	234,324,871	63,550,774

Del Valle—1940, 31,741; Jan.-Aug. 1941, 368,357; total, 400,098. Oak Canyon—Jan.-Aug. 1941, 21,395; total, 21,395.
*Ventura-Newhall production totaled 4,764,450 bbl. prior to 1894.

Los Angeles Basin

Year—	Playa Del Rey	Potrero	Richfield	Rosecrans	Santa Fe Springs	Seal Beach	Torrance	Whittier	Wilmington	Watsonville-Newport, Goleta and miscellaneous	State total
1894										14,715	783,078
1895										4,116	1,245,339
1896										2,135	1,257,780
1897										4,000	1,911,569
1898										3,000	2,249,088
1899										1,500	2,677,875
1900										248,945	4,319,950
1901											7,710,315
1902											14,356,910
1903								752,720		3,670	24,334,481
1904								704,449		39,392	29,548,634
1905								602,575		29,650	34,298,041
1906								641,745		10,090	32,623,229
1907								820,006		69,090	40,102,512
1908								873,210		125,475	48,306,737
1909								847,785		126,775	58,191,723
1910								848,040		58,970	77,697,568
1911								816,728		61,350	83,744,044
1912								747,439		45,870	90,074,439
1913								690,133		27,375	97,867,184
1914								636,789		27,375	103,623,695
1915								758,163		27,375	89,725,776
1916								1,014,667		27,450	91,976,019
1917								1,156,752		27,375	97,781,574
1918								1,046,467		27,375	102,643,415
1919			965,408					1,001,048		27,375	101,907,729
1920			2,565,346					842,184		25,610	105,618,706
1921			8,206,962		208,216			735,376		25,854	114,566,901
1922			8,314,528		11,032,955		190,785	717,729		20,338	139,626,876
1923			6,121,335		79,781,275		3,128,694	645,219		21,058	263,728,895
1924			4,457,679	611,432	26,399,655		17,526,123	761,211		20,979	230,063,117
1925			4,318,488	7,263,466	18,969,528		13,242,113	742,676		53,647	230,147,342
1926			5,574,244	6,114,430	17,446,709	587,107	10,354,905	746,125		53,963	224,117,013
1927		571	7,884,042	3,506,116	15,153,578	16,424,929	8,338,938	660,505		120,196	230,751,463
1928		107,380	6,798,673	2,392,325	16,093,931	12,436,371	6,454,067	612,126		80,422	231,982,597
1929	25,121	271,446	5,776,258	2,463,808	76,477,464	14,418,305	5,000,218	563,790		42,137	292,036,911
1930	4,719,981	638,268	3,643,578	2,435,341	44,251,396	8,026,796	4,116,846	516,802		37,364	228,099,899
1931	9,759,018	353,160	2,433,186	1,344,452	24,272,660	4,882,115	2,191,781	474,261		29,692	188,829,032
1932	5,910,926	252,609	2,263,699	1,125,624	22,538,036	4,522,489	2,281,274	399,540		23,751	178,127,794
1933	4,059,240	141,791	2,467,913	1,080,247	18,271,807	3,991,901	2,362,719	404,128		21,999	173,083,319
1934	3,187,773	150,084	2,925,001	1,037,817	14,722,264	3,515,457	2,525,990	393,476		21,900	175,508,566
1935	5,695,942	135,167	2,803,703	993,195	16,158,795	3,380,526	2,498,442	379,047		21,926	207,832,131
1936	4,643,658	112,556	2,443,126	803,811	16,460,142	3,463,226	2,859,892	346,633		21,960	214,773,315
1937	3,181,059	115,265	3,158,226	1,258,927	15,746,566	3,416,002	2,833,053	333,874	14,185,728	21,900	238,520,383
1938	2,305,321	219,765	3,333,325	3,731,776	12,630,018	3,198,226	5,203,088	337,203	34,167,860	14,125	249,749,246
1939	1,800,533	409,897	3,134,283	4,459,363	10,050,530	2,640,534	6,417,738	353,011	31,100,394	10,950	224,354,048
1940	1,498,274	687,408	3,228,127	4,258,632	9,437,770	2,557,204	4,007,224	180,798	30,195,607	9,150	223,881,712
Jan.-Aug. 1941	888,990	510,916	1,729,783	2,417,118	5,756,385	1,589,800	2,145,579	50,773	20,080,107	6,075	151,566,480
Total	47,675,836	4,106,283	94,546,913	47,297,880	471,859,680	89,050,988	103,679,469	25,155,203	129,729,696	1,745,439	‡5,762,693,900

‡Includes 4,769,450 bbl. produced in Ventura-Newhall prior to 1894.



California Reaches Diamond Birthday as Oil State

(Continued from Page 29)

to a little less than 300 ft. These wells were the first wells that produced oil of any value in the city of Los Angeles.

"Now comes the time when a well was sunk at the corner of Patton and what is now Glendale Boulevard and which was the well that caused the development of the remarkable Los Angeles city oil field. In the latter part of 1892 and the early part of 1893, E. L. Doheny dug a shaft to a depth of 155 ft. and it yielded a few barrels of oil per day. Soon after, he drilled a shallow well alongside of this shaft to a depth as reported at the time to be 375 ft. and the reported production was about 10 bbl. per day. This well created much excitement among oil men and soon many other wells were started and Los Angeles or California's first oil boom was on. Within a short time, hundreds of small derricks appeared in this part of the city and each derrick soon represented a producing well as nearly all of the wells sunk in this part of the city were producers. At a depth of from 630 to less than 800 ft. a productive sand was found that was of an average thickness of about 80 ft. and the average time it took to drill a well was from 2 to 3 weeks. Average production ranged from 20 to 60 bbl. per day and while they slowly declined from this amount it took many years for them to become small producers, that is, from 4 to 5 bbl. per day. Some of the old wells that were drilled almost 50 years ago still produce a few barrels per day.

"There were a few wells that had a much larger production than the average but only a few. One well on Colton Street a few blocks west of Glendale Boulevard for a time produced 300 bbl. per day and the noted Stanley well at Temple and Victor streets produced 400 bbl. per day and had a heavy gas pressure. A well at the junction of First and Second streets near Glendale Boulevard produced 200 bbl. daily for a time. Most of these wells were drilled on city lots as that part of the city had been subdivided previous to the discovery of oil in that vicinity and an operator had to either lease or buy a lot and if leased the lease usually provided that two wells must be drilled thereon. This was the start of town-lot development that has characterized development of several Los Angeles Basin fields. With the discovery of cheap fuel in the city, the real industrial development of Los Angeles begun and soon manufacturing concerns started operations and large quantities of oil were used. Then railroads, hotels, laundries and various other industries commenced using it. One hardware and metal company stated that in furnishing supplies for oil concerns their business advanced from between $150,000 and $200,000 per year to $1,750,000 per year in less than 2 years after the discovery of oil in the Los Angeles city field. Many of the most prominent oil men in California who reached fame and fortune in other fields later on began operations in this field. A long list could be furnished but it is not necessary. There is every reason to believe that deeper and richer sands underlie the first oil sand developed but no effort was made to drill deep test wells and it is not probable now that these sands will ever be developed on account of the growth of the city.

"The price of oil varied from time to time but ranged generally from 75 cents to $1.50 per barrel but at one time reached a price as low as 30 cents a barrel for a short time. This was because of a temporary overproduction. The average development cost, if contracted, was $1 per foot and if necessary one string of casing was furnished by the owner. It was soon found, however, that many of the wells did not need any casing as the holes did not cave and in many of them it was not necessary to make any attempt at a water shutoff. It was thus possible in many cases to drill a well to the oil sand at a cost of from $1,000 to $1,500. In many respects this Los Angeles city field was one of the most remarkable shallow fields ever discovered on the Pacific Coast."

Ventura County

From the earliest history of California, oil springs have been noted off the coast in Ventura and Orange counties and the first examination of the interior lands disclosed numerous seepages of oil, asphaltum and tar. In the early days of the oil industry in California, shallow wells were drilled on or adjacent to these seepages with the crudest of equipment and in many cases tunnels were run into the hillsides to intercept the oil sand with varying degrees of success. This development work many times yielded quantities of oil for which in many cases there was only a limited market which demanded kerosene as the principal refined product and consequently when unable to dispose of crude-oil production the prospector usually folded up. Knowledge of petroleum in California dates back to Ventura County at least as far as the establishment of the original Mission San Buena Ventura in 1786. Within the oldest of these Mission records can be found mention of the presence of crude oil and tar, although at that time it was referred to as brea by the Spanish padres. It is known too that the Portola expedition en route from San Diego to San Francisco encountered Indians a few miles from Santa Barbara making wooden boats and "pitching them within and without" with asphalt or brea. This place Portola named Carpinteria, the carpenter shop. Existence of the La Brea pits in Los Angeles was also known at an early date because this was once selected as the site of a mission. Soon, however, it was found that the livestock were being lost in the pits and the mission was finally located at San Fernando and the Spanish grant to the La Brea Rancho went to another. Irrespective of when the first well was finished in California it has been definitely established that it was in the Ventura-Newhall area.

Prehistoric Bones

In 1888, Stewart & McFarland drilled a hole near the brea beds on the Hancock ranch located just north of Wilshire Boulevard between Fairfax and La Brea avenues in Los Angeles but did not succeed in developing production because, as later determined, the hole had not been drilled deep enough. W. W. Orcutt, in making an examination of the brea beds in this vicinity some years later, noted several white bones protruding from the tarry mass. He became interested and was instrumental in having them removed and a search undertaken for other specimens. Within a short time, several skulls, bones and vertebrae of prehistoric animals were uncovered and removed. These were later forwarded to Leland Stanford University, Mr. Orcutt's alma mater, at Palo Alto for identification and classification. No specimens of the kind had previously been found in the United States and the matter was deemed of such historical value that Mr. Hancock turned over the brea beds for research purposes. In a short time the property, which is now a county park, yielded over 300 complete and incomplete skeletons of saber-tooth tigers, mastodons, elephants, bison, horses, wolves, birds, fox and innumerable small animals were recovered. These brea beds proved to be the richest find of material of this kind opened up to that time. A very complete display of these prehistoric and extinct animals may be found in the museum at Los Angeles, the Smithsonian Institute, University of California at Berkeley, Stanford University at Palo Alto as well as several institutions in Europe. The brea beds, and there are several, have since caked over with a solidified asphalt but come to life again at infrequent intervals. Several narrow escapes have

taken place in recent years and for this reason the pits are now isolated with low retaining walls.

Largest Ventura County Well

Ventura County, with the exception of Ventura Avenue, Rincon, San Miguelito and other recent discoveries, has become known for a long time as a region of comparatively shallow wells with an extremely long life in the pumping stage. Yet in its earlier history it also figured in the so-called gusher period. One of the earliest and largest wells in Ventura County was Union Oil Co. 16 Adams in the Tar Creek field which came in flowing 1,250 bbl. per day over the crown block from a depth of 3,100 ft. The well, designated by old-timers as "Wild Bill" maintained this flow for some time but frequently produced for periods at a daily rate of 5,000 bbl. The flow was so high that at times it could not be controlled with the result that a stream of oil from the well reached a distance of 15 miles down to the Pacific Ocean. The well stopped flowing just as suddenly as it came in and the hole was later abandoned due to collapsed pipe. The Bardsdale field of Ventura County lies south of the Santa Clara River and almost at the mouth of Sespe Creek. The discovery well was drilled by Bardsdale Crude Oil Co. This area, incidentally, is named in honor of Thomas R. Bard, who was president of Union Oil Co. from 1890 to 1894 and who with Lyman Stewart and Wallace Hardison, founded the company and pioneered it through its early history.

Santa Maria

Although seepages were known to exist in the vicinity of Santa Maria as early as 1895, it was not until March 1901 that the first commercial producer was brought in. Just previously, on January 10, 1901, the Lucas gusher came in flowing about 50,000 bbl. per day and the Spindletop field of Texas was born and foundation laid for the Texas Co. which was later to enter California as a producer, refiner and marketer. The first commercial well in Texas, of course, was brought in at Corsicana in October 1895, when the American Well & Producing Co. took a contract to provide the town of Corsicana with a new artesian water supply. The discovery well at Santa Maria was Western Union Oil Co. 2. Three years later, in December 1904, Union Oil Co. brought in 1 Hartnell, the largest flowing well ever finished in that area. Its initial flow was many times in excess of anything that had been developed heretofore in the state and retained this distinction until the big gushers in the Midway-Sunset field were brought in. Gas pressure was so high and the volume of oil, measured in weir boxes by a number of engineers, was placed at 12,000 bbl. per day. It continued flowing at this rate for about 3 months without any apparent diminution and a continuous flow was maintained for over 2 years. The well produced over 2,000,000 bbl. of crude oil before it was placed on the beam. During the next few years, several other gushers were finished in other parts of the Santa Maria district, many of which had a capacity nearly as great as that of 1 Hartnell.

Midway-Sunset

The largest and most spectacular well ever finished in California was 1 Lakeview of Union Oil Co. at Maricopa which blew in March 15, 1910, flowing 15,000 bbl. a day. Production gradually increased, however, until May 18, when it was flowing from 70,000 to 100,000 bbl. per day. The average from this time until July 12 when the well began to decline was 50,000 bbl. daily. The well was running wild during all this period, huge levees and dams being constructed in an effort to prevent the oil from flooding the surrounding area. The flow was so great, however, that crude oil overflowed into all nearby lowlands and reached Buena Vista Lake several miles away. Approximately 9,000,000 bbl. of crude oil were produced during its flowing period of 18 months and about 4,000,000 bbl. were recovered and pumped into Union's heavily taxed pipe line. No estimate has ever been made as to how much gas was blown into the air during this period. The presence of brea and seepages of heavy oil in the foothills of the Temblor Range in the southern end of the San Joaquin Valley was known for many years when pioneering was being done in California but, owing in part to lack of appreciation of production possibilities and especially the absence of adequate transportation facilities in this part of the state and distance from tidewater, Midway-Sunset received but scant attention until the early nineties. Even then the first serious efforts to develop the resources of the region were concerned with asphalt rather than with petroleum and therefore the discovery of commercial production in the Midway-Sunset field may be said to date from 1900.

Pioneering was done in the district by several Bakersfield men in 1889 and 1890, among whom were J. A. Blodget, John Hambleton, Solomon Jewett, J. O. Lovejoy, W. P. Woods and J. H. Woody. William DeWitt was another early pioneer in this section and, while justice of the peace at Tulare, drilled a 300-ft. hole in 2-11n-24e. This well was located near a bed of brea at the very outcropping of the oil bearing strata and was abandoned because of water trouble. It was later found to be located less than half a mile from production and had not been drilled deep enough to find the pay. Jewett & Blodget developed small production of heavy crude oil in the Midway-Sunset field but inadequate transportation facilities and prohibitive railroad freight rates prevented work on anything but a small

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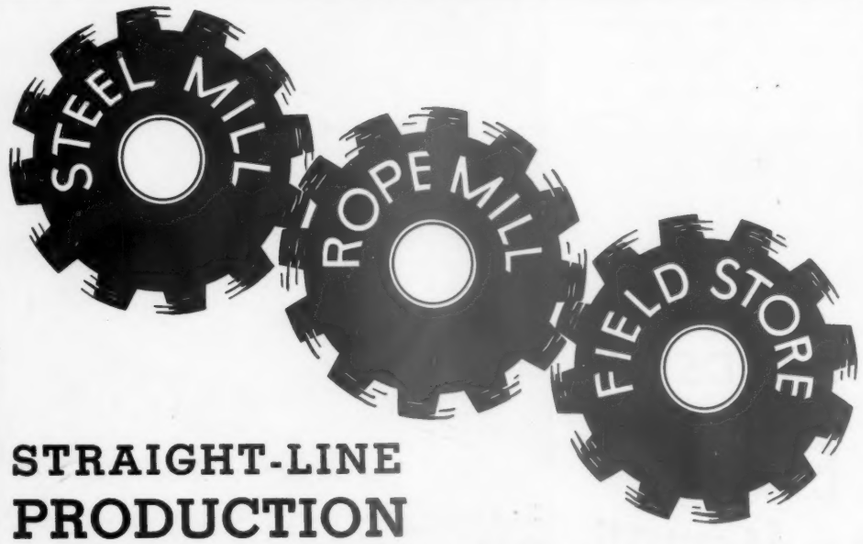
scale. They did, however, begin quarrying and making asphalt in 1891 which was hauled to Bakersfield by mule team and shipped east. This business was not a very remunerative one, however, and they sold out a partial interest in 1892 to the Standard Asphalt Co. The panic of 1893 resulted in a complete suspension of work. W. E. Youle, a driller of wide experience, was later placed in charge of the Jewett & Blodget wells and started work early in 1894. About 15 wells in all were drilled and were good for around 25 bbl. per day of heavy crude oil that averaged 15° in gravity. Operations were suspended again in 1894 but the development of shallow production at Kern River in 1899 furnished the necessary stimulant for a general search for shallow production. The first known sale of Midway oil was by the Producers Guaranty Co. in 1901. Production of Midway-Sunset increased slowly until 1903 when operations were again suspended because of low prices. Kern River crude oil was at that time selling for 10 cents per barrel and these low prices were responsible for formation of the Independent Oil Producers Agency which by concerted action forced the price up to a higher level. The substantial production during this time, however, resulted in fairly low prices for another 4 years and this had a tendency to retard aggressive exploration work.

Claim Jumping

Claim jumping was a favorite but dangerous pastime in the early history of the California oil industry and usually the operator with the largest number of men and most artillery prevailed. Claim jumping was more or less expected in the early days and was not classified as a criminal undertaking along with horse or cattle stealing except where killings took place, and violent death from gun fire occurred quite frequently. The stakes were high, however, and it was not hard to get a group of outlaws and bad men to assist in a little trouble now and then. Bakersfield was a typical frontier boom town in those days and after pay day it was usually customary to take a team of horses and drive uptown to round up the drunks so they would be ready for work the next day. These sprees did not usually last long because what the saloons failed to get the gambling halls got within a short time. These men were a hardy lot, however, and it was of this hard-driving type that the West was built. Kern County must have held some kind of a record during the boom days because they certainly buried a lot of marshals with lead poison. The strong-arm method of gaining possession of potential oil-producing property arose from the method used in securing original acreage for drilling. A prospector who was ready to drill a wildcat simply went up into the San Joaquin Valley and filed a placer claim on unallocated government property and proceeded to drill. If he went into town for supplies some night or for a few days he might find claim jumpers on part of his property and his claim missing when he returned. The thing to do then was to eject the trespassers and this usually meant trouble.

Back in 1910 a group of Goldfield mining men jumped a claim of the Honolulu Oil Corp. in the Buena Vista Hills section of the Midway-Sunset field and proceeded to establish a camp. This group consisted of about 20 men all heavily armed. It was not long after that Jake Pollard, then superintendent for Honolulu arrived on the scene with a gang of about twice the number of the intruders and the invaders from Goldfield, which was no paradise in those days, thought that the Nevada sunshine was more productive of a long life and promptly departed. Within a short time, however, Mr. Pollard and a number of others were arrested on warrants charging battery as there was a little scuffle and general brawl. This action brought the matter to attention of proper authorities and indirectly resulted in enactment of legislation and establishment of the legality of a withdrawal order issued previously by Secretary of Interior Ballanger. Honolulu Oil Corp. was successful in preserving its claims by force of arms and later was granted full rights to several thousand acres by reason of discovery. Some of this acreage was acquired as fee land and the remainder under lease. This company is today a leading California oil producer and is headed by A. C. (Bert) Mattel as president.

The story of Jake Pollard defending his employer's property brings up another interesting sidelight. Jake came to California from Oklahoma at a time when Honolulu Oil Corp. was getting a number of large oil wells and gassers that practically defied all efforts of drillers to control them, especially after they blew out. Jake became field superintendent and in this capacity was in charge of the extensive work done by Honolulu in the Midway-Sunset field of Kern County. This company in its pioneering work in the Buena Vista Hills started from scratch. Due to its extensive acreage the company found it necessary to construct several camps with bunk houses, commissary and cook houses before beginning to drill. Then it was necessary to build extensive roads through a virgin area devoid of anything larger than a jackrabbit trail to the highest elevation in the Midway-Sunset field. Honolulu's preliminary work was well done and finally after it had been completed drilling operations began. After arriving and taking charge of work, Jake Pollard immediately undertook to control a gas well that had been blowing for several weeks. He soon brought the well under control and in doing so introduced a then new method. He is generally credited with being the first to use heavy mud for the control of high gas pressure. In this case Jake used heavy mud, manure, sawdust and other weighty bulky material on hand. The climax to Jake Pollard's career



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was when he organized the Highland Development Co. and leased what is today practically all of the Dominguez oil field in Los Angeles Basin. The results of Highland Development Co.'s drilling program amply indicate the uncertainties and the tough breaks that sometimes befall an operator. Jake Pollard's Dominguez wildcat was abandoned at 3,651 ft. and marked the end of the company. The climax of the story is that subsequent development of the Dominguez field by Union Oil Co. and Shell Oil Co., Inc., reveals the fact that if Jake had drilled another 200 ft. he would have discovered the field a number of years before the major drilling cycle started along the Newport-Beverly shear zone.

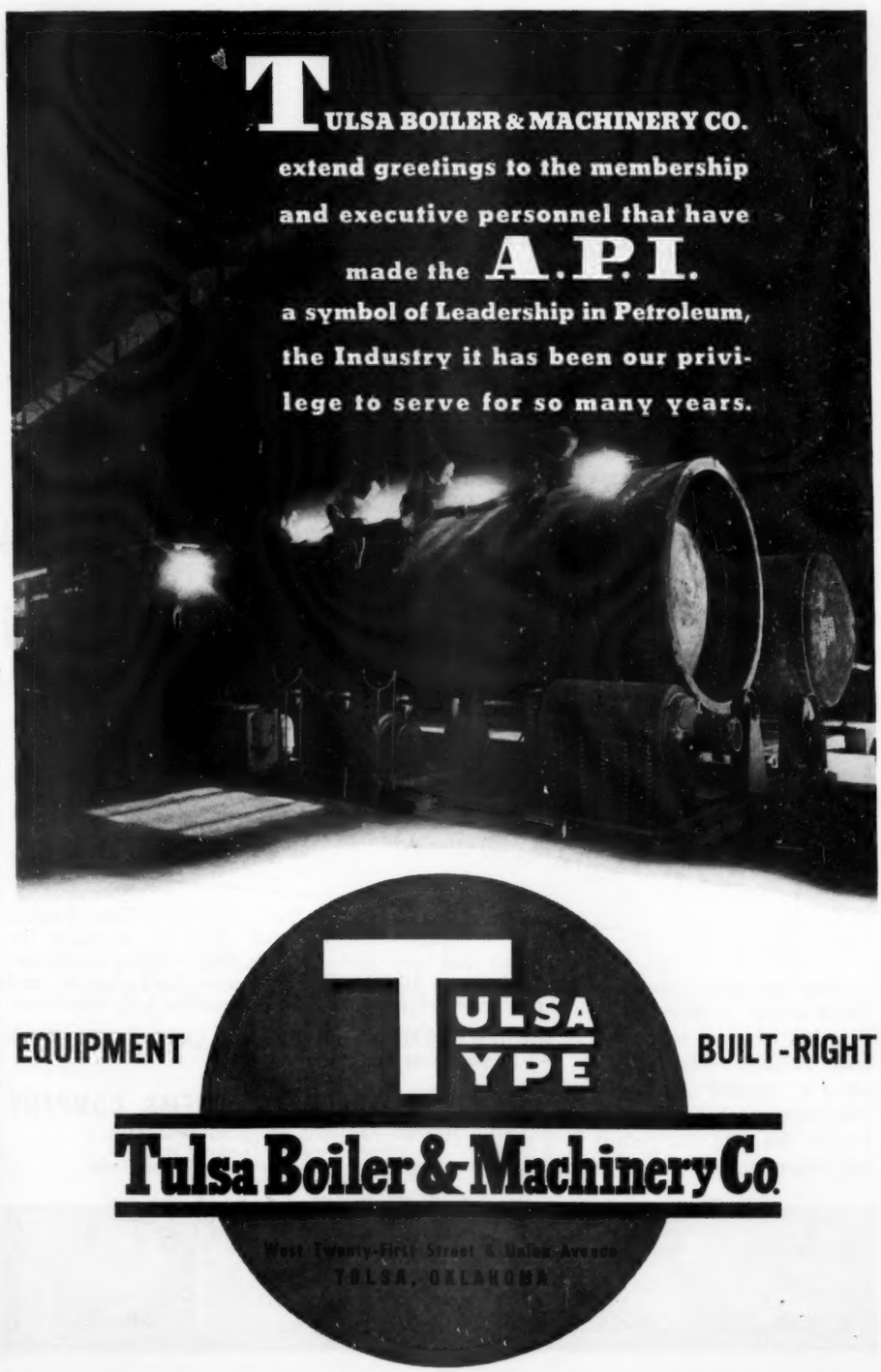
Kern River

Oil was discovered in the Kern River field in 1899 by J. M. Elwood and Tom Means, on the north bank of the Kern River but it was not until 1901 and 1902, however, that this field reached large production. The producing area of the original field lies along the Kern River just north of Bakersfield and is a monoclinal structure dipping to the southwest. The field is a consistent producer of long-lived wells that produce on an average about 2 bbl. per day of oil and a minimum of 25 bbl. of water. The amount of water produced varies throughout the field depending upon whether the field is produced or shut in for long periods of time. At present, water has penetrated to all sections of the field and it will be several months after general production is resumed before the amount of water is again reduced to economic levels. It is necessary for operators to go on steady production in order to keep ahead of the water. Subsequently, George F. Getty, Inc., proved the existence of commercial production out on the Kern Front located west of the original Kern River field and separated by a narrow belt about 1 mile wide. Oldtime operators in the Kern River field look with envy on present-day portable equipment and think what a boon it would have been to have had one of these outfits when they were developing Kern River which is a shallow field but which nevertheless required several months to complete a well.

J. M. Elwood, pioneer operator and discoverer of the Kern River field, by a strange quirk of fate, met his death August 5, 1910, by being crushed under an oil tank containing about 150 bbl. of crude oil. The pressure was so great that practically every bone in his body was broken and he was killed instantly. Mr. Elwood began his work in the Kern River field with a pick and shovel, as did E. L. Doheny in the Los Angeles city field, and after finding oil showings at 60 ft., made arrangements to secure a second-hand drill and proceeded with work until he and Tom Means found the pay. He subsequently sold his holdings in the Kern River field to the Santa Fe Railway and later prospected in Coalinga and Kettleman Hills with Messrs. Cartwright, Lonkey and others. It is interesting to note also that E. L. Doheny, after successfully developing production in the Kern River field, sold his holdings to the Santa Fe which early appreciated the advantages that would accrue from the use of fuel oil in the future. Mr. Doheny had a contract with the Santa Fe whereby the railroad agreed to buy all production developed by the former at $1 per barrel. Kern River production reached the point where it was to the advantage of the Santa Fe to buy Mr. Doheny's production at Kern River. This intrepid pioneer then went down into the Brea Olinda district and again the Santa Fe Railway found it necessary to buy out Mr. Doheny's productive property. The Chanslor-Canfield Midway Oil Co., operating division of the A. T. & S. F., still operates these properties in the Kern River and Brea Olinda fields. The discovery of oil in the Kern River field by J. M. Elwood and Tom Means occupies a prominent page in California's history of the petroleum industry and the premature death of Mr. Elwood left an early vacancy in the ranks of pioneers which for poignant drama and emotion has had few equals.

A Strange Parallel

This is the story of two ships and it all started back in 1914 when there emerged from the Bethlehem Shipyards in San Francisco two tankers, the Frank H. Buck of Tide Water Associated Oil Co. and the Lyman Stewart of Union Oil Co. They were sister ships and identical in every sense of the word. They were built to exactly the some specifications, were identical in all details and they came off the ways together to ply their respective routes in the same business, that of transporting petroleum. Without mishap, at least of any major consequence, they engaged in this trade until October 7, 1922, when the Lyman Stewart collided with the S.S. Walter Luchenbach off Point Lobos, San Francisco, and finally piled up on the rocks just below the Cliffhouse at Mile Rock, a total loss. Thus the first of the two sister ships returned to her home port to perish at the entrance to the Golden Gate, the very portals from which she had so proudly set out just 8 years previous. Then came the astonishing thing. The Frank H. Buck, continued serenely on her way usually moving petroleum products between Pacific Coast ports but once in a while venturing to some far-off port on extended trips to Honolulu, South America and to the East Coast. With little interruption, her schedule was carried on until March 3, 1937, when, without warning, she collided with the S.S. President Coolidge and strangely enough at almost the identical spot where her sister ship, the Lyman Stewart, met disaster in October 1922. The crew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escaped but efforts to tow her to port, after pumping out part of the cargo, were unsuccessful and she finally grounded, broke amidships, and settled down within 50 ft. of the Lyman Stewart, part of whose engines are still visible above the water at low tide. There they now lie, these twin sisters. Built in the same yard in the same year they went their diverse ways, one for 8 years, the other for 23, each to meet an exactly similar fate, 15 years apart, in almost the identical spot and both resting in the same watery plot in the shadow of their birthplace. A tragic coincidence of the sea.

California Pioneers

The early California pioneers were a hardy lot and experienced the many vicissitudes of a new business, the hardships of drilling, the dismay of failure and final exuberation when success came. It is questionable whether there are many other events that prove as exhilerating for a prospector as to have a well go over the top when he is down to his last dollar and discouraged but still of the belief that a little more hole was all that stood between him and production. As witness the case of Charlie Canfield who was cutting wood for the boilers when Chanslor & Canfield's initial well at Coalinga came in unattended. The farmer's sand has always been that way and just as elusive. Edward L. Doheny, who rose from a small calling to become a successful operator in California and Mexico, started his fortune with a pick and shovel in the Los Angeles field but eventually stepped into the Kern River and Brea Olinda fields and experienced exceptional success in Mexico. One of Mr. Doheny's closest associates was Dr. Norman Bridge, a famous physician and surgeon, professor in the Chicago Medical College and author of books on medicine as well as being a keen student of the oil industry. And then there was C. A. (Charlie) Canfield, first president of Associated Oil Co. and associate of J. A. Chanslor in the organization of Chanslor-Canfield Midway Oil Co., which later became the oil department of the Santa Fe Railway and is still an operating company headed by Fred C. Ripley as general manager.

Started Early in Century

The Associated Division of Tide Water Associated Oil Co. came into being in 1901 as a consolidation of numerous properties in the Kern River field and the then being developed field at McKittrick. Among the early sponsors were Canfield and Chanslor, former gold miners who had been associated with E. L. Doheny in several undertakings and who had discovered light crude oil in the Coalinga field about 1895. The discovery of oil by Chanslor and Canfield at Coalinga indicated how wells were drilled and how fate sometimes stepped in and played an important part. The story, which is true by the way, goes like this: Chanslor and Canfield having drilled a number of wells in southern California decided to try their luck and skill in the Coalinga district where conditions looked very good and started shipping their material by horse and mule teams. Incidentally it was customary to use two horses in the lead and four or more mules behind although in good teams the two horses were many times used as the wheel team at the wagon tongue. Several miles from where Chanslor and Canfield had intended to drill, the team became bogged down and, faced with the necessity of unloading and then loading again, Mr. Canfield ventured the opinion that their present location was as good as any so they began drilling operations. A little superstition might have entered Mr. Canfield's mind but as might be expected they completed a good well and found the Oil City pool at Coalinga. Others in the organizing group of Associated Oil Co. were Max Whittier, a splendid character memory of whom still lingers a number of years after his death, and B. E. Green, who had spent several years in the Salt Lake field and were partners in a venture at Kern River. Associated Oil Co. still operates the Green and Whittier properties which it secured in the Kern River field so many years ago. Max Whittier had been a field worker and by this time had secured some good acreage and had completed a number of good wells so his entrance into the Associated Oil Co. was a normal expectation and mutually advantageous. In addition to being a man of great business ability, he was mechanically inclined as is indicated by the fact that he invented the rotary tool joint. Other pioneers who contributed to organization of Associated Oil Co. included B. F. Brooks, H. M. Reed, W. F. Chandler, M. J. Laymance, Othello Scribner, Henry Ach, John A. Bunting, a railroad conductor on the Southern Pacific, and W. S. Porter, who was a pipe salesman. All were interested in the Kern River field and their holdings ranged from a few acres to entire sections of 640 acres. The company was incorporated in October 1901, and about 40 companies and operators accepted stock and bonds for their individual holdings to form Associated Oil Co. Associated's pipe line from the San Joaquin Valley to Avon in the San Francisco Bay district was constructed in 1908 and is still in use although reconditioned and welded in later years.

While Associated Oil Co. was in the process of growing, Capt. William Matson was founding the Pacific Oil & Transportation Co., for the purpose of marketing fuel oil. Operations grew and the National Oil & Transportation came into being in 1903. This company built a 6-in. pipe line in 1904 from Coalinga to Monterey through which oil was moved for loading into Captain Matson's boats. This was the first pipe line of

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any consequence laid in California and although it has since been welded and reconditioned it is still in use by Associated Oil Co., which in the meantime had acquired it from the Matson interests. In addition to this activity, Captain Matson, following discovery of production in the Santa Maria district, formed the California Coast Oil Co. and built a pipe line from a small refinery at Gaviota to the productive area at Santa Maria. Captain Matson organized the Honolulu Oil Corp. and directed its destinies for a number of years along with A. C. Diericx.

Interesting Pioneer

One of the most interesting pioneers in the California oil industry was Captain John Barneson, founder and directing genius of General Petroleum Corp. for a number of years. He went to sea at 14 on a clipper ship running between Australia and the South Seas and at 21 was master of his own sailing ship. In 1890, he formed a brokerage firm at Port Townsend, Wash., with another partner and for some time represented Andrew Wier, of London, England. This partnership did not last long because Captain Barneson's partner joined the Klondike gold rush and Captain Barneson went broke trying to corner all the river boats in the area. The Spanish-American war broke out then and when Dewey asked for volunteers, Captain Barneson joined and was appointed commanding officer of the U.S.S. Arizona. After discharge, he chartered a number of boats in the Pacific and this formed the basis of his fortune. After railroads had found fuel oil satisfactory, he discussed with Capt. William Matson the possibility of steamboats using fuel oil to advantage. The steamer Enterprise was accordingly equipped to use fuel oil and sailed for Honolulu. This trial run proved eminently successful and led to numerous other installations. It is interesting to note that 10 or 12 years later the U. S. Government started building battleships using fuel oil for the first time. In 1912 the battleships, Nevada and Oklahoma, were the first Navy ships designed to burn oil.

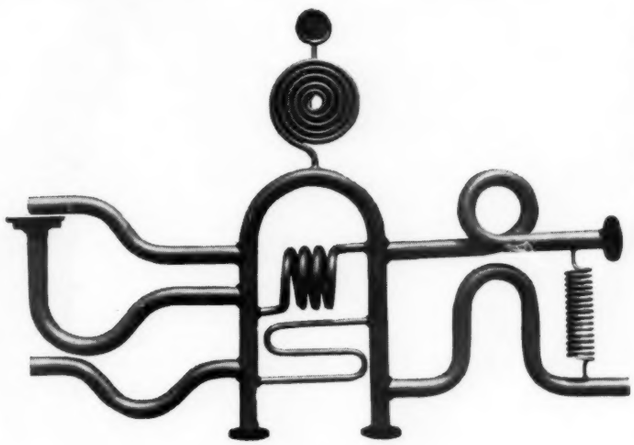
General Petroleum Corp. came into being in 1905 as the Esperanza Oil & Gas Co. and in 1910, Esperanza Consolidated was formed to consolidate all holdings of the former. Then came a merger between the Esperanza and Los Alamos Oil & Development Co. and Mr. Barneson became vice president of Esperanza, and E. J. de Sabla, who later was to become the father of electric power transmission, was elected president. By 1912, the company had acquired considerable production and its entire output was disposed of through the Independent Oil Producers Agency. In 1913, Andrew Wier, multimillionaire English shipping magnate and former associate of Captain Barneson, came back into the picture. Together they obtained an option to buy the Union Oil Co. for $30,000,000. This option held in the name of General Petroleum Corp. expired in 1915 when the deal finally fell through due to inability to secure the necessary finances. Capt. John Barneson resigned as president of General Petroleum Corp. in 1926 and his son Lionel Barneson was elected as his successor.

Elected President

D. G. Scofield, the pioneer, was general manager of the Pacific Coast Oil Co. from the time it came into existence in Newhall as an independent company until it was sold to Standard Oil Co. and formed the nucleus of this great company. Mr. Scofield, who was vice president of the original Standard Oil Co. at 26 Broadway, New York, was elected president of the Standard Oil Co. of California, upon the dissolution of the main company by federal action in 1911. He was succeeded by W. S. Rheem, who in turn was succeeded by Kenneth R. Kingsbury, who became a powerful factor in the California petroleum industry. Other officers who have contributed to the success of Standard Oil Co. of California include William H. Berg and the present president, H. D. Collier. Other early executives of Standard Oil Co. include W. S. Miller, F. H. Hillman, R. J. Hanna and H. M. Storey. Dr. Elic Stark contributed much to the company through his geological work and his recommendations with respect to wildcat wells were always carried out and in many instances opened up new fields. Standard Oil Co. from its small beginning has risen until at present it is the largest oil company on the Pacific Coast with the largest retail outlets, excellent refining and pipe-line facilities and the largest single reserve of crude oil. It is a big company in every sense of the word, is ably managed and enjoys the respect of both large and small operators.

The decade from 1909 to 1919 was a period of great expansion for Standard Oil Co. as by this time it was well grounded and rapidly growing. It was during this period that gasoline supplanted kerosene as the principal refined product and fuel-oil consumption was growing due to a broadening market. Standard Oil Co. became aware of the transition and immediately undertook plans to meet the inevitable. In 1914, it started in the gasoline-marketing field by buying 30 outlets from the National Supply Co. and from this time on the company constantly built additional stations from the Mexican border on the south to the Canadian border on the north, both of which it was later to cross and engage in production and marketing operations. Standard Oil Co. built the El Segundo refinery in southern California in 1911 and converted a group of sand dunes into a growing community. The refinery at Richmond and 8-in. pipe lines from San Joaquin Valley fields northward to Richmond were completed in 1904-05.

Outstanding independent oil pioneers include



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Clarence J. Berry, who used the fortune he wrested from the frozen wastes of Alaska to make a second in California, and his brother, Henry Berry. Then there was Timothy and Peter Spellacy, John McGinn, F. G. Manley, C. A. Barlow, L. P. St. Clair, Stanley Morshead, W. B. Robb, M. V. McQuigg, W. S. (Uncle Billy) Rowland, who was at one time sheriff of Los Angeles County, S. C. Graham and William Loftus of the Graham & Loftus Oil Co., W. W. Orcutt, A. L. Weil, H. A. Jastro, Jerry Kent of the United Oil Co., Thomas A. O'Donnell, who in addition to being a successful operator and organizer of California Petroleum Co. and other companies since acquired by Texas Co., was first president of the American Petroleum Institute; J. E. O'Donnell, Gen. R. L. Peeler, W. L. Valentine, E. J. Miley, Fred Henderson, J. E. Koberle, J. C. Anderson and many others. It is impossible to outline the many excellent attributes of these men but the story of Tom O'Donnell is quite similar to the others. Mr. O'Donnell made his original stake in the Midway-Sunset field of Kern County but did not stop here as he later organized the Petroleum Midway Co., California Petroleum Corp., Red Star Petroleum Co. and others and participated in the greatest development cycle in the history of Los Angeles Basin. His companies leased and developed numerous properties in Long Beach, Santa Fe Springs, Montebello, Huntington Beach, Richfield and at the peak of production turned over his properties to the Texas Co. and retired. In later years, Tom tells the story that in his early experiences in securing and developing properties he was sure the Standard Oil Co. was organized for the specific purpose of putting Tom O'Donnell out of business. Of course, he always follows up with the statement that he now has some pigs of his own and was mistaken.

Captain Lucey is another pioneer who had an interesting career. Born in Ireland, he came to the United States early in life and later entered the U. S. Army. In the Spanish-American War, he became captain of artillery and upon reentering private life came into the Kern River field as president of the Enterprise Oil Co., which was one of the first members of the Independent Oil Producers Agency. Captain Lucey later left the oil business and went into the supply business and established branches in all fields throughout the country. Captain Lucey was in Rumania when World War 1 started and after crossing Austria and Germany to Amsterdam on his way home, he was called to aid former Pres. Herbert Hoover with Belgian relief work. His business was ruined by the World War and the Russian revolution but he came up smiling. The Guiberson Brothers formed another of the famous brother combinations that went far in this pioneering period.

Shell Enters Production Quest

Shell Oil Co., Inc., entered the Pacific Coast territory rather late but by 1913 Shell's subsidiary, American Gasoline Co., a marketing concern, had reached the point where J. C. van Eck and H. R. Gallagher were of the opinion that it would be advantageous to secure production in this rapidly growing area. Negotiations were accordingly opened in June, 1913, between Shell and the London Board of California Oilfields, Ltd., which began operations at Coalinga in 1901 and which throughout the years steadily acquired additional production and acreage. In July 1913, Shell Transport and Royal Dutch Petroleum Co. purchased the holdings of the California Oilfields, Ltd., for a consideration of $14,000,000. J. C. van Eck was chosen chairman of the board of the newly organized Shell Oil Co. of California and two men representing Balfour-Guthrie, John Lawson and B. D. Adamson, were also members of the board. Herbert Gallagher was another member of the board and was in charge of sales. He remained with Shell for a number of years until he resigned to become president of Consolidated Oil Co. and subsequently retired. Shell has consistently expanded in all branches of the industry since 1913 and today is a strong completely integrated unit in the California area. In 1915, Shell, through the wisdom of Mr. Van Eck, constructed a new refinery at Martinez in the San Francisco Bay region and at the same time laid a pipe line northward from Coalinga to Martinez. Later a second pipe line was laid from Coalinga to Martinez and branches extended to include other San Joaquin Valley fields. The first barrel of oil was put through the Martinez refinery January 15, 1916, and in subsequent years when Shell had developed substantial production in Los Angeles Basin the company erected an additional refinery at Wilmington in the Los Angeles Harbor district and later a new plant in the Dominguez district. Its latest development was the recent laying of a new crude-oil pipe line from Ventura Avenue to its refineries in Los Angeles Basin. A number of years ago, Shell constructed a natural-gasoline pipe line from Ventura Avenue to Los Angeles and today has two pipe lines out of this field. This casinghead line was the first completely automatic natural-gasoline line in the world and it is still functioning as an automatic unit.

Land Titles Early Problem

During the early pioneer days, prospectors were constantly confronted with the problem of perfecting title to their placer claims on which they had developed commercial production which, under the old laws belonged to him who appropriated and put to use any unappropriated acreage. Liti-

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gation attending some of these placer claims extended over a number of years especially in the San Joaquin Valley and another extended period of litigation resulted from the creation of Naval Reserves 1 and 2 and the withdrawal of considerable land in Kern County at a time when prospectors were already drilling or had made oil discoveries. One of the most interesting title actions of late years was the recent attempt of the city of Long Beach to secure title to 678 acres of enormously valuable land in the Long Beach Harbor district. The city lost this attempt on many points including among other things the right of possession, statute of limitations, payment of taxes by those in possession and the approval of many actions which tended to indicate that the city recognized the existing titles many years ago.

This trial, extending over several months, brought to light a number of interesting facts, many of which were taken from records of the Title Insurance & Trust Co. of Los Angeles. The records showed that the entire area involving Long Beach, Seal Beach and Coyote Hills was at one time held in a single Spanish grant. All of these areas are productive at the present time. It was brought out that the King of Spain, in 1780, granted to Don Manuel Niato all the lands between the Santa Ana and San Gabriel rivers. This grant was made through the then governor of Mexico, Don Pedro Vegas. Don Manuel, retiring from the Spanish Army, repaired to his new holdings, named them Los Cerros Rancho, and built a house in which to live. As a result of a conflict of interests the grant was subsequently split into five tracts named Los Cerritos, Los Coyotes, Las Bolsa, Los Alamitos and Santa Gertrudes ranchos. These names are familiar to most California operators because the Los Coyotes Rancho is now the East and West Coyote fields, the Santa Gertrudes Rancho is a part of the Santa Fe Springs field and Las Bolsa and Los Alamitos are in the Huntington Beach and Seal Beach fields. Another interesting point brought out was that 27,000 acres comprising the Long Beach area was sold in 1867 to Llewellyn Bixby and Benjamin and Thomas Field for $20,000. Failure of the city of Long Beach to gain a favorable decision is of paramount importance to a number of operators in the Wilmington field as it upheld the existing title to property by Union Pacific Railroad, Southern California Edison Co., Ford Motor Co. together with other property developed by General Petroleum Corp., Richfield Oil Corp. and many others. Today's operators are the pioneers of tomorrow but the achievements of today's pioneers cannot be dimmed with time as they started a period that for shear brilliance has never been exceeded.

●

New Method of Washing Gravel-Packed Liners

(Continued from Page 95)

circulated as the small clearance outside the liner makes formation of a bridge a distinct possibility.

The formation scratchers are used in all cases where prepacked liners are installed except when it is necessary to perform an intermediate cementing job on the liner. In this case the use of a cementing basket makes it unwise, if not impossible, to attempt movement of the liner when once it has been placed.

A so-called "delayed action" liner hanger is used, making it possible to circulate fluid around the top of the liner after it has been hung and disengaged from the drill pipe. This is considered a necessity for a successful washing job. (After the washing operation has been completed, the lead seal of the liner hanger is expanded by the weight of the drill pipe and the expanding mandrel is then held in place by slips.) The liner hanger and the prepacked liner assembly were illustrated in The Oil and Gas Journal, June 5, 1941, Page 92. Scarcity of aluminum for making the special alloy has necessitated some changes since the date of the illustration.

Washing the Prepacked Liner

The Taylor washer is made up on the end of the drill pipe, using 2⅞-in. flush-joint drill pipe as a tail on the 3½-in. string so that the washer can be run to the bottom of the liner. Placement of the swab rubbers on the washer is a matter of choice, but the interval between the opposed rubbers is usually 1 ft. This 1-ft. interval in which the fluid is discharged is placed opposite the lowest perforations of the liner and the pump at the surface is started. Circulation is carried on for 1 minute before the drill pipe is raised to take in a new interval. If the pressure recorded on the gage at the surface is considered too high, circulation is carried on for a longer period to see if the differential pressure through the gravel pack can be reduced by thorough washing.

The pipe is raised 6 in. at a time so that no intervals can be missed. It is, of course, necessary to shut down the pump before attempting to raise the drill pipe, as otherwise the swab rubbers would adhere to the liner.

It has been noted that much less pressure builds up while washing a liner if the walls of the hole have previously been scraped by the formation scratchers. Thus the washer has served to show the effectiveness of an instrument which otherwise would be very difficult to evaluate.

A regular 7¼ by 14-in. slush pump is usually used for circulation of the fluid, but sometimes a cementing truck is employed for the sake of convenience or because greater pressures are required.

In nearly all cases water is used as the circulating medium while washing prepacked liners, though light mud is more likely to be used when the formation scratchers are being applied to the open hole. In some wells too much formation pressure is encountered to risk displacing the mud from the hole during either operation. In such instances clean 75-lb. mud (10 lb. per gal.) is used. The difference in the washing value of the two fluids is shown by the following excerpt from a field report. The report also serves as an account of a typical liner-washing operation in which the washing follows an intermediate cementing job.

"Following cementing of the 4¾-in. casing perforations at 3,202 ft., perforations in the prepacked liner were washed, using mud circulated through the L. T. Taylor perforation washer to check possible clogged intervals. The Taylor washer consists of four swab rubbers (two up and two down) with circulation holes in the 1-ft. interval between the middle pair of rubbers. Pacific Cementing Co. pumps were used for circulating the fluid down the drill pipe at the rate of 10 cu. ft. per minute. Ten strokes of the pump (approximately ½ minute) were made for each setting of the washer, and the drill pipe was raised about 6 in. for each setting.

"The bottom of the perforated interval at 2,934 ft. was located. It required 900 to 1,000 lb. pressure to break circulation, then pressure dropped to 700 lb. From 2,934 to 2,930 ft., washing pressure was 700 lb. From 2,930 to 2,925 ft., pressure would build up slowly to 1,000 lb. then jump to 1,400 lb. (stalling pressure of pump) in a few strokes as though the perforations were open at first but sealed up due to plastering of mud. The interval 2,925 to 2,866 ft. was washed with mud pressures of 1,000 to 1,400 lb.

"Washing with mud was discontinued. Mud in the drill pipe was displaced with water and the washer was run back to 2,934 ft. Water flowed out of the drill pipe so that the lower portion of the pipe filled with mud. When the pump was started, a pressure of 1,500 lb. was obtained, probably due to the presence of mud in bottom of pipe.

"Washer was pulled by intervals to 2,924 ft. before circulation was obtained. By that time all mud in the pipe had been replaced with water, and all perforations above this point were washed under 800 lb. pressure with water.

"The perforations between 2,934 and 2,728 ft. were washed a second time with water under pressure of 600 lb. throughout. The interval 2,934 to 2,924 ft., which was closed the first time, was opened on this run. The pump and washer were the same during the circulation of both mud and water."

Liner washing in the past has been carried on with the operators "in the dark," but the above report shows that a type of information has now been made available that enables the men on the derrick floor to understand what is taking place in the bottom of the hole. When the job outlined above had been completed, all persons concerned had a record to show that every foot of the prepacked liner was open to the passage of fluid, and since the washed intervals checked the well measurements, it was known that the liner had been landed as had been planned.

After washing of the liner has been completed, it is standard practice to raise the washer well above the top of the liner and replace the water in the casing with mud, which is intended to hold the well under control while the tubing is run and the christmas tree is assembled.

Time required for washing depends on liner length and the depth, but a few examples of actual jobs are as follows: For cleaning 836 ft. of prepacked liner in the upper Terminal zone, 13½ hours were required, including running in, washing, and placing the mud cap in the casing. For cleaning 661 ft. of liner in the Ford zone (total depth 5,400 ft.) 12 hours were required for the job. For cleaning 256 ft. of liner in the Ranger zone, 8½ hours were required.

It is considered unwise to pump even water through one interval of a prepacked liner longer than is necessary, because it has been found that the pressure sometimes tends to build up in such a case. In most instances the pressure will drop about 200 lb. during the normal course of pumping, but there have been many cases in which the recording gage showed no noticeable drop in pressure.

Advancements in Gravel Packing at Wilmington

In the wells that are completed by pumping gravel around the liners by reversed circulation, some improvements have been made. Gravel used is slightly larger than that used in the prepacked liners because a much thicker pack is available to trap the incoming sand. Gravel sizes range from 0.132 to 0.187-in. diameter. Flush-joint pipe is now used for the liner, and this is centered in the enlarged hole by centralizers which are made with Securaloy rings and four bronze leaf springs, thereby making it possible to wash over the liner if removal should become desirable.

After placement, the gravel is washed free of mud by using an open-ended tail pipe on the drill pipe, which is packed off in the liner by inverted swab rubbers. The washer is raised about 5 ft. at a time during washing, allowing 5 minutes for circulation at each setting. Since the washing pressure is not confined to one interval of the liner at a time, pressures are not so high as when the Taylor washer is used, and there is no way of ascertaining that all parts of the liner and gravel pack have been opened to the passage of fluid. Sometimes calcareous mud is used in placing the gravel and subsequent acid treatment helps to provide a mud-free gravel pack. When gravel pack is installed as a measure in reconditioning old wells, oil circulation is used to place the gravel.

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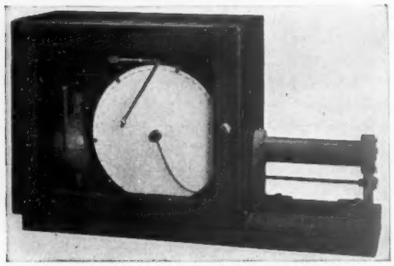

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Improvements Continue in Drilling And Production Practices

(Continued from Page 35)

butane engine. Several of these derrick-carrying portable rigs are in use in the shallower fields of the Bakersfield area.

In the Newhall-Del Valle area, where larger "spark plug" rigs are used, several new units have been put into service recently. California Western Oil Co. now maintains three large internal-combustion-engine rigs, and Rocky Mountain Drilling Co. has purchased a new rig to meet conditions found in the newly developed Jasper area.

Electric Rigs

The world's second deepest well, Honolulu Oil Co. 25-P in the Buena Vista Hills, was drilled to 14,622 ft. with electric motors using purchased power. The draw works was driven by two 125-hp. a.c. motors compounded through a synchronizing gear. Another 125-hp. motor was used to drive the rotary table by means of a direct-shaft connection. Motors of like size were also used on each of three mud pumps. For years Honolulu has drilled almost exclusively with purchased power. Barnsdall Oil Co. is another extensive user of this type of drilling rig in California.

A number of d.c. electric rigs are in use in California, notably the portable models used by Union Oil Co. for shallower completions, such as in the Santa Maria field on the coast. A rig of this kind has been designed for rapid moving, economy of fuel; and its power characteristics are comparable to those of steam.

Bits and Hole Size

Rock bits are now used for nearly all California drilling, the drag bit having been displaced in much of the work for which it was formerly considered most suitable. One result of this change appears to be a tendency to use casing that leaves less cementing space between the outside diameter of the string and the hole. It has always been common practice in California to allow more clearance between the casing and the hole than is customary in the Mid-Continent fields. The reason for this greater clearance lies in the nature of California strata. Being far less competent than the older Mid-Continent formations, California shales have a more pronounced tendency to swell or shift into the walls of the hole. It is believed that in the past much difficulty has been avoided by the customary California practice.

A typical example of California practice in running casing is seen in the records of the Robert S. Lytle interests in the Coalinga Nose field. Here the long string of casing installed in all the wells is 6,800-7,800 ft. of 8⅝-in. o.d. pipe, which is run in holes drilled with 12¼-in. bits. Some California operators prefer to use 8¼-in. casing in a 12¼-in. hole. To many Mid-Continent operators, unfamiliar with California strata, this would appear to be a waste of valuable hole space, and there is now evidence available which seems to indicate that the prevalent use of rock bits, plus the use of better drilling mud, has now made such wide clearance unnecessary in a number of cases. It is noted that in completing three wells in the Wasco field, Rocky Mountain Drilling Co. ran and cemented 9⅝-in. casing in 12¼-in. holes at depths of about 8,100 ft. in all three wells. The longer strings were 6⅝-in. extremeline casing which were cemented in 8½-in. holes at about 13,075 ft. Since these three wells are the deepest in the world for which contracts have been written, it is worthy of note that the Mid-Continent casing practice proved successful in their case. (The deepest hole ever drilled by a contracting firm was the 14,582-ft. 1 Proctor in Washita County, Oklahoma, drilled by Fain Drilling Co. for Continental Oil Co. It is distinguished from the Wasco wells drilled by Rocky Mountain Drilling Co. because of the fact that the contract was not written for the depth eventually reached by the exploratory hole.)

Slim Holes

There is a notable tendency toward slim holes, or at least the modified slim hole, in California. About 4 years ago nearly all wells were completed with an 8⅝-in. producing string. At present the most popular oil string is the 7-in. o.d. size. At least two major companies are finishing wells with 5½-in. producing strings in some parts of the San Joaquin Valley. It is the popular belief at present that the drilling of the smaller-diameter holes results in far greater tool-joint wear on the drill pipe, and that this wear tends to offset any economies gained in reduced casing costs. Other operators believe that the best way to avoid excessive tool-joint wear is through the use of drill-pipe stabilizers or protectors rather than by maintaining hole sizes that will make it possible for enough drilling mud to accumulate on the walls of the hole to offer some protection against abrasion.

It has been concluded by the California operators who have experimented with slim-hole drilling that in order to derive the expected economy from the practice it is necessary that the entire rig should be designed for the drilling task contemplated. If, on an ordinary steam rig, the conventional drill pipe and casing sizes are replaced by much smaller sizes, it is quite impossible to obtain all the economies for which slim-hole drilling was first inaugurated. With the properly balanced rig, part of the savings result from having to move lighter surface equipment.

Those who believe in slim-hole drilling are inclined to evaluate it upon the basis of the following example: By conventional methods a well is to cost $25,000, and can be expected to pay back $40,000 worth of oil. If, through slim-hole drilling, the cost of the well can be reduced to $20,000, the investment has only been reduced by 20 per cent, but the return on the investment has been increased by 40 per cent (or from 160 to 200 per cent), provided that the same ultimate production can be obtained. Even more important is the fact that the payout time under proration has been considerably reduced. When considered in this way it is seen that even though the operator loses production toward the end of a well's life because of its diameter, or even if a well is lost in drilling from time to time for the same reason, the slim-hole practice may still be economically successful.

The most important argument against slim-hole drilling is still the possibility that deepening to a lower sand may become desirable at some future date. California operators are overcoming this difficulty to a large extent by confining the drilling of the narrowest holes to areas where it is quite definitely known that no oil horizons exist immediately below the well's objective pay. Also, with the greatly extended periods of production due to low withdrawals, some companies feel it is no longer necessary to plan for the future on the basis of today's production methods. By the time deepening of today's wells becomes advisable, it may be practicable to deepen 5½-in. holes. Many of the items of equipment and technique that would make this possible are at hand today.

As in other parts of the country where slim-hole drilling has undergone experiment, there has developed a noticable tendency to avoid strings of casing smaller than the 5½-in. size. In Shell's Ten Section field of the San Joaquin Valley a practice was evolved whereby 4½-in. round-thread casing or tubing was used in place of drill pipe. This string, minus bit and drill collars, was cemented in the well as the production string after drilling the oil sand. The practice is still used,

but 4½-in. pipe has been replaced by 5½-in. casing in all later applications.

Some firms use the telescoped hole as a means of guarding against sticking of the drill pipe in the upper reaches of the hole. An example is a recent completion in which 11¾-in. surface pipe was first set. After drilling several thousand feet below the shoe with a 10⅝-in. bit, the size was reduced to 10¼-in. Later the hole size was reduced to 9⅝-in., and finally an 8⅝-in. bit was used in reaching a depth below 11,000 ft. A string of 5½-in. casing was cemented at this depth. Telescoping made it possible for thick mud accumulations to line the walls of the hole, thereby helping to prevent loss of water to the formations, and also tending to protect the drill pipe against excessive wear. Complete protection was probably afforded against the possibility that shales might swell to stick the drill pipe in the upper portions of the hole, but the records show that a very large amount of rock was drilled up in order to complete a well with minimum-sized casing.

Stress placed on field inspection of tubular goods has resulted in the introduction of new instruments. One instrument makes possible a visual inspection of a pipe's interior, while with a second it is possible to measure wall thickness electrically from the outside. Most field inspection is centered on threads, however A.P.I. gages are used in the field by some companies. In running casing, it is usually possible to inspect the threads at only one end of each joint, as the threads on the other are covered by a coupling. One manufacturer has obviated this difficulty by doing away with the coupling. Joints have one end upset, with an internal thread.

Cementing

The introduction of bulk cementing in the San Joaquin Valley offers several advantages never before available. The cement-dispensing trucks are loaded with bulk cement from large hoppers situated on the highway about 12 miles northwest of Bakersfield. Each truck carries about 300 sacks in loose form, and is covered to prevent damage by rain. At the well the truck uses a screw-type conveyor to feed the cement into the mixing hopper at a uniform rate. With water entering the hopper at a regulated rate, it is possible to maintain any desired water-cement ratio without variance throughout the cementing job.

Bulk cementing has resulted in many savings. The unused portion, instead of being left at the location, is retained in the cement-dispensing truck, and is credited to the purchaser when the truck returns to the bulk plant. This accounting is made possible by meters on the screw-type conveyors which record the number of sacks fed into the hopper from each truck. Other advantages of bulk cementing include the fact that it is no longer necessary to hire extra men for the cementing job, a consideration of increasing importance because of the war effort.

A new and improved process for series cementing has been devised and is being used notably in Kettleman Hills. The process makes it possible to place slurry behind a string of casing or a liner at any number of predetermined points, and the stages can be placed in rapid succession. For cementing long strings of casing, a continuous column of slurry can be placed in any desired number of intervals, with each interval being allowed to set, undisturbed, while the stages above are placed. Since this operation can be carried on rapidly, it is possible to use slurry of low water-cement ratio.

The series-cementing development finds its most valuable application with long liners or combination strings which require a number of intermediate cementing jobs. The slurry is pumped in through a string of drill pipe or tubing. Terminating this string is a mandrel which is designed to engage and form a seal within each of a series-cementing collar. A system of valves is opened to make it possible for slurry to be discharged through the mandrel and out the ports of the series-cementing collar in which it is set. Any number of these cementing collars can be included in the casing string or liner, and the mandrel can engage each successively. After the cement has set, that portion of the cementing collar that projects inside the casing's internal diameter is drilled out, since it is composed of drillable materials.

In accordance with experimental work carried on by one of the large companies, most California operators now take some means of improving the bond between the cement and the walls of the hole. Experiments have shown that if no such measures are taken, longitudinal stringers of mud cake will be left in the annulus, and if these are close to the shoe, the job may be a failure. Methods used for removing mud cake to bring about a closer bond between the cement and formation include the use of washing action, or jetting. A down-whirler float shoe directs jets of light mud or water so that they will impinge against the walls of the hole with considerable force. This operation is carried out just before pumping in the cement slurry. The pipe is moved up and down several times while pumping is in progress so that the hole above the shoe will be washed for a distance of about 30 ft. Movement of the pipe is sometimes continued while the slurry is being pumped through the whirler ports. By experiment it was found that whirler shoes which were designed so that 80 per cent of the discharge was through the side ports could remove the mud cake entirely where this procedure was followed.

Another method for removing mud cake calls for the use of mechanical scratchers which are placed on the casing or liner when the string is being made up. When the pipe is moved upward, the scratchers engage the walls of the hole to scrape off the mud cake. They also serve to center the casing in the hole so that it can be completely surrounded by slurry for some distance above the shoe.

When a hole is reentered after cementing casing, it is first necessary to drill out the cement that has remained in the bottom of the casing. Due to the clearance between bit and casing, this operation is almost certain to leave a thin, imperfect sheath of cement insde the pipe. Hard and brittle, the breaking up of this sheath could probably explain many of the otherwise unaccounted-for fishing jobs that have occurred in the past. It is reported that pieces of cement, possibly of this origin, have been found in the standing valves of oil-well pumps, where they caused pulling jobs. A tool has recently been introduced which is designed for removing all the cement from inside the casing without injuring the pipe or the shoe.

A New Completion Process

A strange type of well completion has been developed in the Los Angeles Basin, and has proved beneficial in at least one instance. A well was brought in from a depth of about 8,000 ft. near Rosecrans, but it would flow only by small heads, and these heads had to be induced by swabbing. In a calcareous formation, acid would have been used to increase the flow of gas and oil, but since the sand was practically void of calcareous cement, no benefit could have been derived from acidizing.

As is well known to those familiar with squeeze cementing, it is possible to "open up" a sand formation by forcing clear water through the sand. This practice has become general as a step preceding a cement squeeze job, as "breaking down" the formation with water makes it possible to put away more slurry and reduces the necessary pump pressure.

It was therefore reasoned that an oil sand could be opened up in like manner by resorting to a squeeze job. Water would obviously be un-

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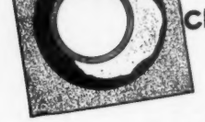

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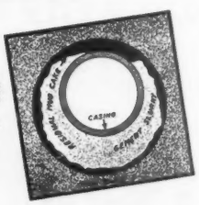

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suitable as the washing fluid, so gas oil was obtained. The well had been completed with a slotted liner, and a full string of 2½-in. tubing had been run. In order to make it possible to raise and lower this tubing string during washing operations, two ram-type blowout preventers were installed at the tubing head. A special releasable back-pressure valve was installed in the landing joint of the tubing. This device is designed so that it can be removed under pressure.

Before the oil-squeeze was attempted, gas oil was pumped down the tubing to wash out the well completely. Nearly 500 bbl. of gas oil were circulated at a rapid rate before the returns emerging from the 7-in. casing were considered sufficiently free from drilling mud, water and cuttings. At this point the casing was closed and a pressure of 900 lb. was built up while 45 bbl. of gas oil were being forced out into the oil zone. The amount of strata exposed in the hole was 246 ft., much of which consisted of shale.

After completion of the washing and squeezing operation, the well was swabbed in the tubing for nearly 12 hours. During this swabbing, the casing pressure built up to 500 lb., and flow through the tubing started against a back pressure of 140 lb. The well was found capable of flowing unaided at a rate of 100 bbl. per day of 31-gravity oil through a 10/64-in. surface choke, a considerable improvement over the former production. Thus it appears that a new practice has been developed which may take its place beside acidizing and shooting as a means of increasing the production.

Well-Servicing Derricks

Within recent months truck-mounted well-servicing units with telescoping derricks capable of handling 10,000 ft. of 2½-in. tubing have made it possible to extend this practice to the deepest pumping wells in California.

Several derrick-carrying well-servicing units are now in use in the coastal fields and in the Los Angeles Basin. The largest of these are mounted on six-wheel 28-ton trucks, using the all-wheel-drive principle. One of these units is now working in the mountainous Ventura field, and in spite of its weight it has experienced no trouble in reaching the wells on the mountain heights. This same pulling unit has been equipped with a power-operated tubing tong to speed up the assembling of tubing strings.

The power tong has been made an integral part of the servicing unit. It is hung from the derrick, making use of a counterbalance. Its self-engaging jaws are mounted within a large circular main gear which has an open throat to permit insertion over the pipe. This main gear is operated by two drive gears which are so placed that one will always be engaged while the other is over the cutaway portion of the main gear. The two gears are driven by a fourth and this in turn is connected to the crankshaft of a radial-type pneumatic engine. Compressed air for driving the engine is supplied by an engine-driven compressor mounted permanently on the truck bed of the unit. The power tong not only speeds up the running of tubing, but it makes possible a uniform thread makeup throughout the string.

By providing derrick-carrying units capable of servicing wells deeper than today's deepest pumpers, a margin has been provided that will make this type of equipment acceptable for servicing California wells of all depths in the future.

At the present time, when wells are completed, either deep or shallow, the drilling derrick is moved to the next location, and none is erected in its place. Since the heavy servicing units meet road limitations, they can travel to fields distant from their bases to service wells for which other equipment is not provided.

One of the most novel operations in the oil industry is found on the main coast highway, at Huntington Beach, where a producing company has drilled a series of wells in perfect alignment so that each series can be serviced by a single track-mounted derrick. In this way six standard 87-ft. derricks are made to serve 27 wells. Three of the series consist of five wells each while three more series consist of four wells each. These wells are not shallow producers. Directed for uniform spacing, their drilled depths vary from 4,500 to 5,500 ft. Each is pumped with an air-balanced pumping unit.

Each track-mounted derrick has small wheels at each corner and can easily be rolled on the tracks and centered over any one of the wells of the series it is intended to service. A winch or tractor is commonly used for moving the derricks. The wire lines and other accessories can be left in place in the derricks. A continuous slab of concrete has been poured between the tracks at each of the series of wells, and this forms a floor around each of the pumping units.

New Control for Flowing Wells

The side-inlet choke is being used successfully for controlling the gas-oil ratio in flowing wells where the gas is mainly derived from a sand above the oil sand. Several wells in the Coalinga Nose field are controlled in this manner. Production by this means calls for a special type of well completion. The final string of casing is ordinarily cemented just above the gas zone and a slotted liner is run so that the slots will be opposite the oil zone, while a blank liner section will extend past the gas zone and up into the casing shoe. The liner is then hung and cement is forced through the top perforations so that it will cover the gas zone. A gun perforator is used to shoot several holes in the liner opposite the top of the gas zone.

When tubing is run, a packer is installed with a side-inlet choke above it. The packer is set in the blank portion of the liner just below the gun perforations. Gas entering the hole is then available above the packer while the oil enters the tubing below the packer. The side-inlet choke then provides a means of admitting the gas to the inside of the tubing at any desired rate. The inlet is adjusted at the surface by pulling the inside cylinder with a small wire-line hoist of the type used for subsurface pressure and fluid-level tests. After adjusting the orifice at the surface, the cylinder is returned to its position where it is sealed inside an outer cylinder by means of cups on either side of the inlet.

Cleaning Liners With Explosives

A majority of California wells have been completed with slotted liners to prevent caving of the loosely consolidated oil sands. One of the most prevalent production problems concerns itself with keeping the slots open to the passage of fluid. They tend to clog up with sand, silt, shale, or paraffin, and with cementing material carried by encroached water. Several innovations have recently been used for cleaning slots.

One slot-cleaning method uses a tool on the end of drill pipe or tubing through which water is pumped from the surface to emerge between two opposed swab rubbers. By this means the washing action is confined to a very small portion of the liner so that the pressure supplied by the pumps at the surface will be most effective in dislodging material from the slots. A recording pressure gage is used on the pump discharge at the surface so that it can be seen how much resistance is offered to the flow of fluid by each portion of the liner. This also indicates whether or not the pressure is sufficient to open up the slots.

The use of explosives for opening up slots appears to be meeting with success. First work of this kind was carried out with gas bombs. The principle is to create inside of the liner a low-velocity concussion wave that will have sufficient

force to flush the slots and surrounding formation without breaking or distorting the liner. The gas torpedo, loaded with an explosive mixture of methane and oxygen, is lowered into the liner on a sand line, and is detonated by a go-devil dropped from the surface to strike a firing mechanism. The methane is put in at a shop, but the oxygen, which brings the pressure in the bomb up to 500 lb., is introduced after the bomb has been lowered into the casing. Three-inch tubing is used for the bomb, and this is grooved so that it will break to release the gas upon explosion, but will still come out of the hole in one piece. It is always tested with 600-lb. water pressure before it is loaded.

The most recent work on the use of explosives for liner cleaning has made use of fuselike explosive, similar to the Cordeau-Bickford fuse used to set off dynamite or other explosives in mining work. The long wire-shaped explosive is weighted and hung through the liner while it is detonated. Experiments on the surface showed that this method would dislodge cementing material composed of litharge and glycerin, one of the hardest of cements, from the slots. With one or two applications there was no noticeable change in the slot measurements, but after a number of explosions a widening of the slots was perceptible.

In the San Joaquin Valley, work has been carried on to remove paraffin from slotted liners by means of heat generated by an exothermal chemical reaction within the liners. Beneficial results have been reported in some cases.

Testing Subsurface Equipment

In recent months the most noticeable change in pumping practice is in the attention given to testing of subsurface equipment at the surface to avoid failure in the hole. Fortunately, this practice does not mean the early discarding of expensive equipment. Instead, by adequate testing, all equipment can be used to approach its maximum life without endangering other installations. Formerly, the safe operator, lacking tests with which to find weaknesses in his equipment, resorted to the practice of retiring whole strings of tubing or sucker rods when failures began to appear. Now, several testing methods are acceptable for use of the well-servicing departments.

For measuring the wear inside of tubing, a test of great importance in all crooked holes, an instrument can be drawn through the string to give an electrical record of all badly worn places. The instrument comprises a bundle of fingers which are forced outward against the tubing walls. When a finger enters a groove or hole, it makes contact with a ring, and this is recorded at the surface. The contact ring is adjustable so that in a series of runs the approximate depth of all grooves or pits can be determined. Bad joints can then be replaced and the remainder of the string can continue in service safely.

Inspection of tubing threads usually includes the use of a special brushing device which is inserted over the threads and then removed by turning so that the bristles will follow the threads to remove all foreign material.

One of the most unusual of the new testing instruments is the magnetic tester for fatigue in sucker rods. Metallurgical changes in sucker-rod steels influence the magnetic characteristics. Making use of this principle, an instrument has been designed for use at the well head. The well-head unit contains a coil through which the sucker rods are drawn. A small amount of current is supplied to the coil from a motor-generator set mounted in a light truck. Intended primarily to avoid fatigue breaks, the instrument will also reveal flaws or improper heat treatment in new rods.

Pressure Maintenance

Gas is now being returned to the oil-producing zones in a number of California fields. These include Continental Oil Co.'s San Miguelito field near Ventura, the Dominguez and the Seal Beach fields in the Los Angeles Basin, and the Kettleman Hills and Canal fields of the San Joaquin Valley. The most recent field to adopt pressure maintenance was the Canal field, which is operated by Shell Oil Co., Inc., and Ohio Oil Co., with Standard Oil Co. of California owning a small parcel of land in the field about their pump station. These three companies cooperated to bring about gas injection, with Shell Oil Co., Inc., overseeing the installation of compressor plant.

Some operators feel that the serious production problem facing the owners of deep wells can be largely avoided through pressure maintenance. It is admitted that it will always be an expensive undertaking to pump wells more than 10,000 ft. deep, and while gas injection is also expensive, it could serve to postpone pumping stage indefinitely if carried on with sufficient gas volume.

A new type of secondary recovery is in use in the Mount Poso and Kern Front fields of the Bakersfield area. The fields have experienced unusually heavy volumes of encroaching water in the oil sands, and the practice adopted by some operators consist in using large-capacity centrifugal pumps to produce the water as fast as possible. By lowering the pressure head on the water, oil that had previously been trapped off is washed into the wells and produced with the water.

●

California Deep Wells

OF the 29 wells in the world that have been drilled deeper than 13,000 ft., 22 are in California. The depths, locations and owners of these wells are listed below.

15,004 ft.—Continental Oil Co. 2-A K.C.L., Wasco, Kern County.
14,622 ft.—Honolulu Oil Corp. 25-P fee, Buena Vista Hills, Kern County.
14,122 ft.—Superior Oil Co., 13 Kern County Land, Kern County.
14,051 ft.—Continental Oil Co. D-2 K.C.L., Strand, Kern County.
14,018 ft.—Superior Oil Co. 1 Helbling, Rio Bravo, Kern County.
13,957 ft.—Shell Oil Co., Inc. B-87-4 K.C.L., Canal, Kern County.
13,873 ft.—Shell Oil Co., Inc. 2-A 52-13 K.C.L., San Emigdio Ranch, Kern County.
13,716 ft.—Standard Oil Co. of California 8-B-1 K.C.L., Wasco, Kern County.
13,644 ft.—Continental Oil Co. A-3-8 K.C.L., Wasco, Kern County.
13,538 ft.—Standard Oil Co. of California 1 Elrich Community, Greeley, Kern County.
13,158 ft.—Continental Oil Co. A-5-8 K.C.L., Wasco Kern County.
13,153 ft.—Continental Oil Co. A-4 K.C.L., Wasco, Kern County.
13,150 ft.—George F. Getty Co. 2 Meyer, Wasco, Kern County.
13,139 ft.—Continental Oil Co. 1 Meyer, Wasco, Kern County.
13,139 ft.—Standard Oil Co. of California 1 Mushrush, Wasco, Kern County.
13,135 ft.—Standard Oil Co. of California 8-B-2 K.C.L., Wasco, Kern County.
13,135 ft.—Standard Oil Co. of California 4 Mushrush, Wasco, Kern County.
13,131 ft.—George F. Getty 1 Jannssen, Wasco, Kern County.
13,131 ft.—Superior Oil Co. K.C.L.-12, 3-30-26, Kern County.
13,130 ft.—Standard Oil Co. of California 5 Mushrush, Wasco, Kern County.
13,130 ft.—Standard Oil Co. of California 3 Mushrush, Wasco, Kern County.
13,124 ft.—Standard Oil Co. of California 2 Mushrush, Wasco, Kern County.
13,064 ft.—Continental Oil Co. and Seaboard Oil Co. C-1 K.C.L., Wasco, Kern County.

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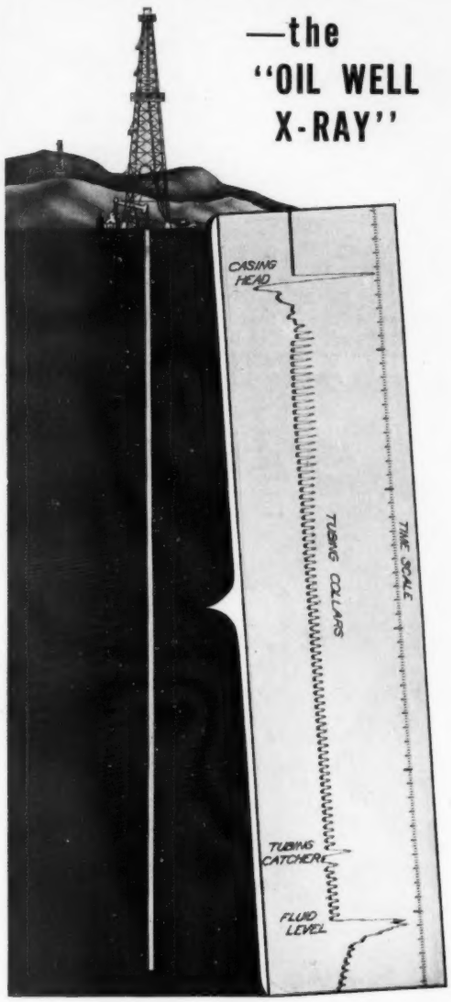

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(Continued from Page 51)

gas through the annular space between tubing and casing as this leaves the tubing free to blow out any water that may have accumulated in the bottom of the hole.

Transmission Facilities

The present highly specialized status of the California natural-gas industry is the outgrowth of a consistent expansion coincident with the progressive increase in the petroleum industry especially during the past 15 years. With the exception of a restricted utilization of dry marsh gas near Stockton and Sacramento in 1895, the first known commercial distribution of natural gas in California was at Santa Maria in Santa Barbara County, where the Santa Maria Gas & Power Co. started in 1907 to sell natural gas produced in the Santa Maria fields. The aggregate amount distributed by this company was relatively small due to the limited demand, but this was the first commercial application of natural gas for domestic consumption in California. From this small beginning, the California natural-gas industry has grown to the point where practically every community in the state, with the exception of the very northernmost section, is using natural gas for domestic consumption and in manufacturing establishments. Natural-gas transmission lines extend southward to San Diego and northward to San Francisco, Stockton, Sacramento, Petaluma and other communities in that section of the state.

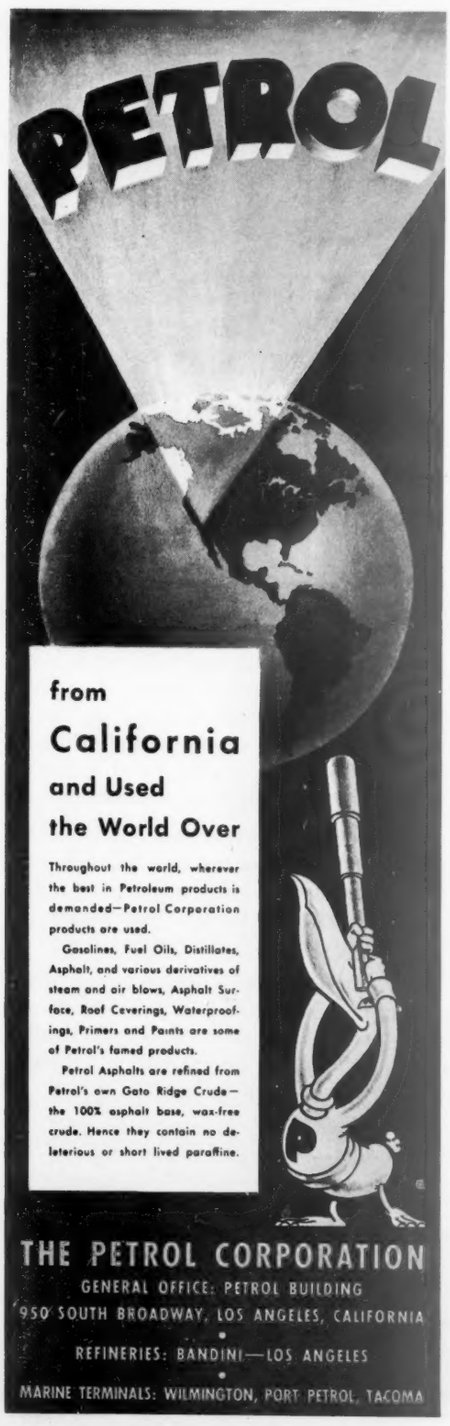
The first transmission line was probably a pipe line laid in 1908 between Bakersfield and Taft, using as a source of supply the natural gas produced in the Midway-Sunset field. A 12-in. natural-gas transmission line 110 miles in length was laid by Midway Gas Co. from Taft in the Midway-Sunset field in Kern County to the Los Angeles area in 1913. This was the first long-distance gas line in California and is the forerunner of the present extensive system of natural-gas transmission lines comprising a total of more than 3,000 miles of pipe of varying diameters. Following discovery of the Buttonwillow gas field and later discovery of the Kettleman North Dome field, considerable progress was made and natural-gas transmission lines soon tapped every source of supply carrying natural gas to Los Angeles in southern California and later to San Francisco and the San Francisco Bay region.

Gas Fields

The several dry-gas fields discovered in California up to the present are located in three widely separated geographic areas. These districts comprise the San Joaquin basin, the coastal basin located along the seacoast in Santa Barbara, Ventura and San Luis Obispo counties and the area located adjacent to the San Francisco Bay region. Prior to the discovery of the Kettleman North Dome field in the latter part of 1928, the natural-gas market in California was limited primarily to the southern California area. Gas for this market was supplied from Los Angeles Basin oil fields, Ventura Avenue, Buena Vista Hills section of the Midway-Sunset field and Elk Hills in the San Joaquin Valley. Discovery and subsequent development of Kettleman Hills, with wells showing initials of 100,000,000 cu. ft. of natural gas with a small amount of light-gravity condensate from the gas cap, was the start of an era of expansion that resulted in the laying of numerous new gas lines and discovery of several new gas fields throughout the state. Two 22-in. lines and one 10-in. natural-gas transmission line were built into the Kettleman North Dome field by Standard Oil Co. and Pacific Gas & Electric Co. to supply the northern California market, and one 20-in. and one 26-in. were laid into southern California by Southern California Gas Co. from this and adjacent fields.

The Buena Vista Lake gas field is located 18 miles southwest of Bakersfield in Kern County. It was found productive by Ohio Oil Co. in 1934, after a seismograph survey in 1933 had indicated the existence of an anticline of sufficient structural closure to warrant a test. Buena Vista Lake gas field is the first producing gas field resulting from reflection-seismograph exploration and it is interesting to note that the discovery well in the field has proved to be the highest structurally. Within the limits of the field there is less than 5 ft. of topographic relief as the surface is that of a smooth lake bed. The average surface elevation is 290 ft. above sea level. No surface evidence of structure is evident nor does there seem to be any banding or zoning of alkali belts around the field. A feature, however, of the lake bottom sedimentation is a bed of gypsiferous earth that lies close to the surface, allowing water from the lake to make its way under the levee on the west end of the lake until it finds points of less resistance where it breaks through to the surface in seeps and boils.

The Delano (Trico) gas field of Kern and Kings counties is located in the center of the San Joaquin basin about 37 miles northwest of Bakersfield. Topography of the area consists of relatively flat sagebrush land with little or no surface indication of structure. This field was discovered by reflection seismograph and is an anticlinal dome. Commercial gas production is found in the San Joaquin clay series in upper Pliocene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sediments as is the case at Buena Vista Lake gas field. Two zones, the first Mya and the second Mya, are productive and vary in thickness from 20 to 100 ft. and consist of 25 per cent sand. The Delano gas field was discovered by Trico Oil & Gas Co. on November 18, 1934, when the discovery well in 3-25s-23e, was brought in flowing 3,000,000 cu. ft. daily from 2,475 ft. in the first Mya zone. The field was given its first pipe-line outlet early in 1939 as the field remained relatively inactive for several years after discovery.

Chowchilla

The Chowchilla gas field of Madera County, which appears to have only limited commercial production possibilities at present, was discovered by Pure Oil Co. April 2, 1935, following a seismograph survey. The productive wells are located on a 42,000-acre ranch owned in fee by Western Meat Co., a subsidiary of Swift & Co., of Chicago. Gas production was found at 8,030 ft. and at this point the well was approximately 3,800 ft. below the top of the Cretaceous contact. A second zone was found in 1935 at 2,390-2,800 ft, but it appears to be rather limited in areal extent. Ohio Oil Co. discovered a productive gas field in the Willows area located along the west side of the Sacramento Valley in Glenn County on August 23, 1938, but this field has not yet been given pipe-line outlets. The Willows gas field is located 135 miles northeast of San Francisco and production was secured in the Cretaceous. The discovery well in the Willows area was the second drilled by the company as the first test got away and became a total wreck from gas and high head water in addition to swallowing a couple of automobiles. It was estimated that the first well blew in flowing 100,000,000 cu. ft. of gas and 100,000 bbl. of salt water per day. Accumulation in the field occurs in a closed anticlinal structure which was discovered by use of a reflection seismograph. This field has not gone on commercial production since discovery.

The Marysville Buttes gas field is located about 14 miles west of Marysville on the southerly flank of the Sutter Buttes in Sutter County. Production comes from the Cretaceous which is topped at about 2,500 ft. and from a zone totaling 30 ft. in thickness. This is one of the most interesting gas fields in the state. The Sutter Buttes have been formed by a volcanic intrusion that has cut through all of the great thickness of Cretaceous rocks underlying the Sacramento Valley. Since these formations are developed to an estimated thickness of about 10 miles some realization may be had of the channels for gas migration to be opened up through the cracked sedimentary rocks which have become brittle adjacent to the hot volcanic core which has passed through all of them. The former volcano of the Marysville Buttes is surrounded by a ring of sediments which, from their outcrops, are found to consist of Chico (Cretaceous) rocks, of Eocene beds and of later Miocene and Pliocene gravels, sands and clays. Back in 1864, a shaft was sunk to a depth of 40 ft. in search of coal on the Buttes but an inflammable gas was found in a sandstone deposit and resulted in an explosion and injury to the miners. The Cretaceous rocks in northern California reach enormous thicknesses and it is estimated that of this series there is an approximate thickness of 21,000 ft. of Chico; 6,000 ft. of Horsetown and 20,000 ft. of Knoxville present.

Buttonwillow

The Buttonwillow gas field is located on the floor of the San Joaquin Valley about 30 miles west and 5 miles north of Bakersfield in Kern County. It is the oldest central valley floor field, having been discovered by Milham Exploration Co. in 1926 prior to the development of successful geophysical exploration. Although this region is flat, attention was first drawn to the area by a gentle topographic high that previously led to the drilling of an oil well that was abandoned due to failure to find an oil sand at a shallow depth. The discovery well of Milham blew out November 3, 1926, from a depth of 3,323 ft., cratered and destroyed the rig and equipment. First actual commercial production was developed August 4, 1927. The structure is a gentle anticlinal fold having a northwest-southeast trend and has a closure of about 250 ft. This field has been on restricted commercial production on several occasions but as a rule is only produced during the winter period.

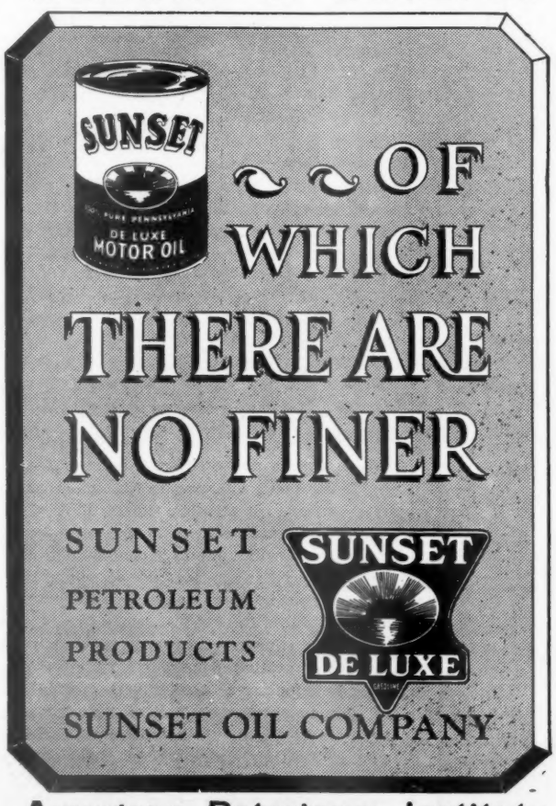
McDonald Island

The McDonald Island gas field, which is located on McDonald and Roberts islands 10 miles northwest of Stockton in San Joaquin County, was discovered by Standard Oil Co., following a seismograph survey. First production was secured June 2, 1936, although reconnaissance work in the fall of 1935 indicated the existence of an anticline and detailed work revealed a closed dome. Considerable difficulty was experienced with the seismograph due to the terrain and the proximity of the river. The gas produced is chiefly methane. Production is run through the Stan-Pac line which is connected with field gathering lines at Byron and in the 23 miles from McDonald Island to Byron the natural gas line crosses three rivers, the San Joaquin, Middle River and the Old River. The surface of McDonald Island is a perfectly flat plane at sea level elevation and like other islands of the San Joaquin-Sacramento delta area, is protected by large expensive levees which exclude river and tide waters.

Tracy

The Tracy gas field of San Joaquin County was the first commercial gas field found in the north-

Welcome to California



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central part of the state. It is located in the extreme northwest portion of the San Joaquin Valley about 20 miles southwest of Stockton and near the town of Tracy. It was located by reflection seismograph work carried on by Amerada Petroleum Corp., which drilled and completed the discovery well August 11, 1935. Production is derived from 100 ft. of gas sand in a 350-ft. interval in Upper Cretaceous. Productive acreage is quite limited and consequently the reserve of the field is rather small. A few miles south of Tracy in San Joaquin Valley, Standard Oil Co. completed a gas well in the Vernalis gas field on January 5, 1941, in rocks of Cretaceous age. Because of the proximity of these two fields it is logical to assume that the production characteristics of both should be quite similar. Pending further exploratory work Vernalis must be classed as a probationary field having commercial possibilities. It was located by reflection seismograph.

Rio Vista

The Rio Vista gas field of Solano and Sacramento counties was discovered by Amerada Petroleum Corp., by geological mapping and reflection seismograph work June 18, 1936. The field is located near the town of Rio Vista, about 45 miles northeast of San Francisco, 30 miles south of Sacramento and 25 miles northwest of Stockton. The discovery well was 1 Emigh, and top of the Emigh gas zone was logged at 4,292 ft. and continued to a depth of 4,485 ft. The Emigh zone, from which present production is secured, is possibly of Eocene age. The amount of sand varies throughout the field and in many cases permeability in the white sand is quite high. In instances the productive zone contains 65 per cent porous sand. Calorific value of the gas is 1,040 B.t.u., the highest of any dry gas in California. It is approximately 96 per cent methane and 3 per cent ethane with the remainder made up of higher hydrocarbon fractions and inert gases.

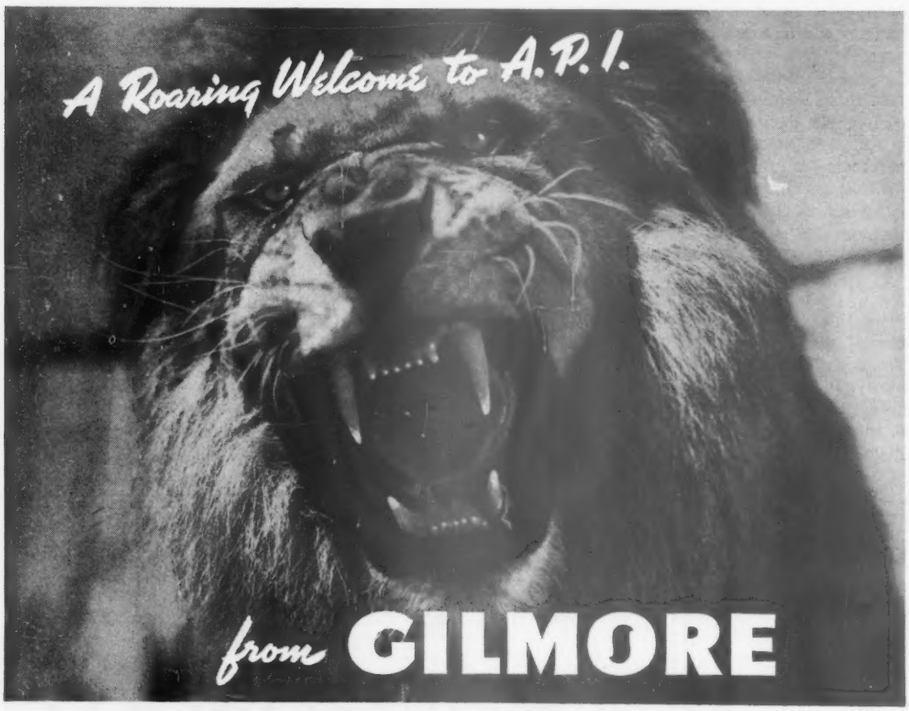
Potrero Hills

The Potrero Hills gas field, which has not yet gone on commercial production and hence is not generally recognized as a dry-gas reserve, is located in Solano County about 40 miles northeast of San Francisco and approximately midway between Sacramento and San Francisco. The structure coincides in general with the contours of an isolated, low-lying range of hills which rise from Suisun Bay at sea level to an elevation of 428 ft. The range is elliptical in shape and is about 5 miles long and 2 miles wide. Gas seepages have long been recognized and as far back as 1896 a hand-augur hole was drilled to a depth of 120 ft. Richfield Oil Corp. leased the entire Potrero Hills structure in 1931 and in April 1938 the company finished its first gas well in rocks of Cretaceous age at 3,265 ft. The gas consists of approximately 89 per cent methane and has a heating value of 991 B.t.u. The structure is reflected in the topography and is an east-west trending asymetric dome. Steep dips are found on the south flank but the north flank is somewhat gentler with dips averaging about 35°. This field warrants further development and exploratory work and in the meantime it will be recognized as having commercial possibilities as far as gas is concerned. Only a limited amount of drilling has taken place to date.

Goleta

The Goleta gas field of Santa Barbara County is located on the coast line of the Pacific Ocean at the mouth of Goleta Slough about 4 miles east of the Elwood oil field. It is one of several structures lying within the belt of folding which extends along the sea coast from Carpinteria to Point Concepcion, parallel to the south flank of the Santa Ynez Range. Gas seepages have been known for many years along the east bank of Goleta Slough where it is crossed by the axis of the Goleta structure. The field was discovered August 5, 1929, by General Petroleum Corp. The first well blew out and was subsequently redrilled and recompleted September 19, 1929, flowing 50,000,000 cu. ft. of dry gas daily. The Goleta structure is an asymetric anticlinal dome complicated by overthrust faulting along the crest. Production is developed in lower Miocene Vaqueros sandstone in a zone about 350 ft. thick. On January 1, 1941, Pacific Lighting Co. acquired possession of producing properties in the Goleta gas field and this reservoir will be used to store surplus gas which will be withdrawn as required. This is the first undertaking of its kind in California and the company is to be commended for its action.

A survey is now being made in California by the Department of Natural Resources and other state bodies to determine the amount of natural gas reserves and disposition of future production. This survey will include recommendations as to how the production will be used and in what industries it is most desirable. Marketers have long recognized the need of restricting outlets and the conservation of natural gas so that it may be used for domestic purposes exclusively if possible. There is a feeling that commercial establishments are able to operate on fuel oil satisfactorily and that natural gas should be conserved for domestic uses, in heating and cooking. This survey has been going on for several months and will be a very complete survey when finished. The problem is a very complex one as California does not have any regulatory legislation.



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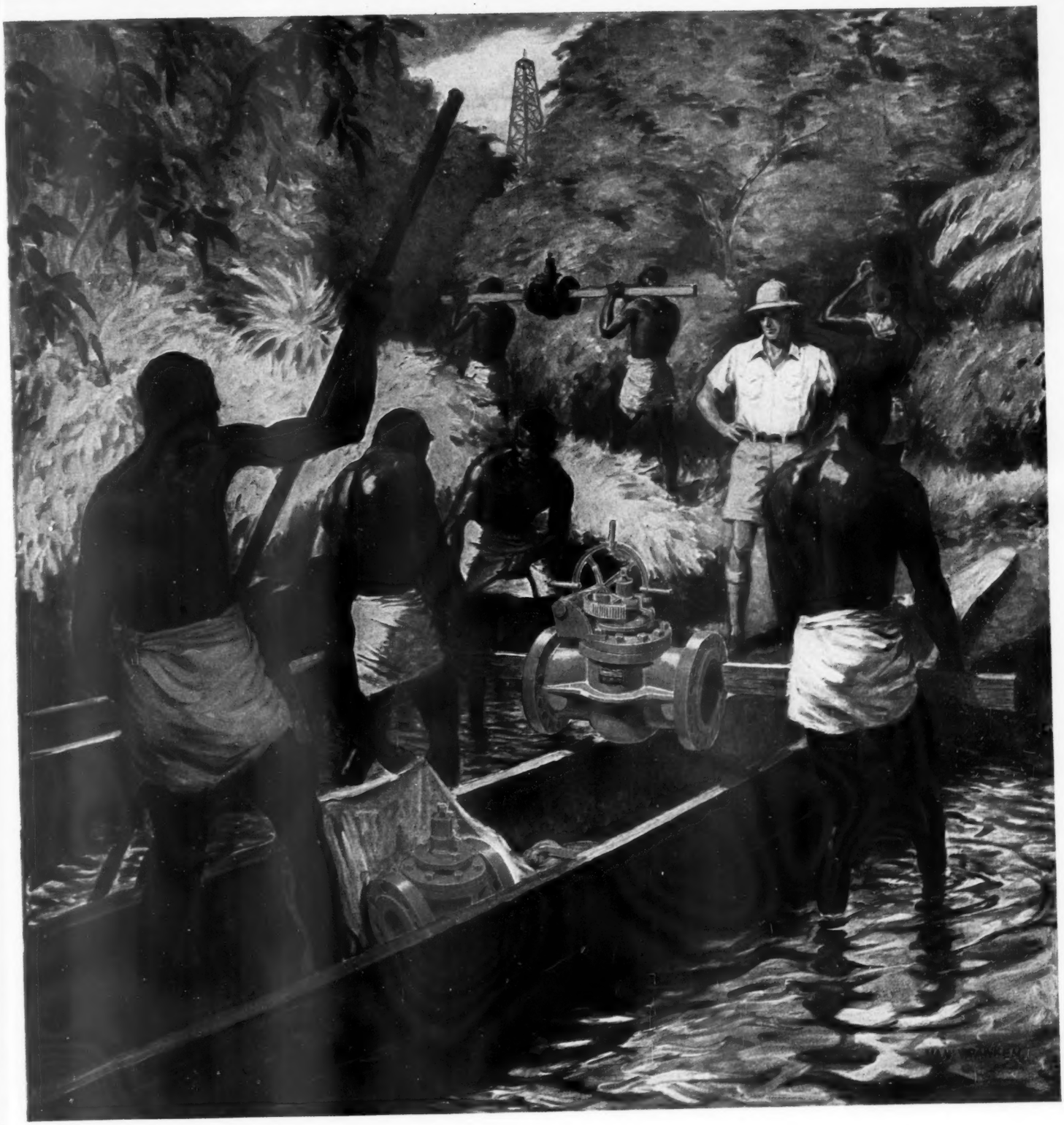

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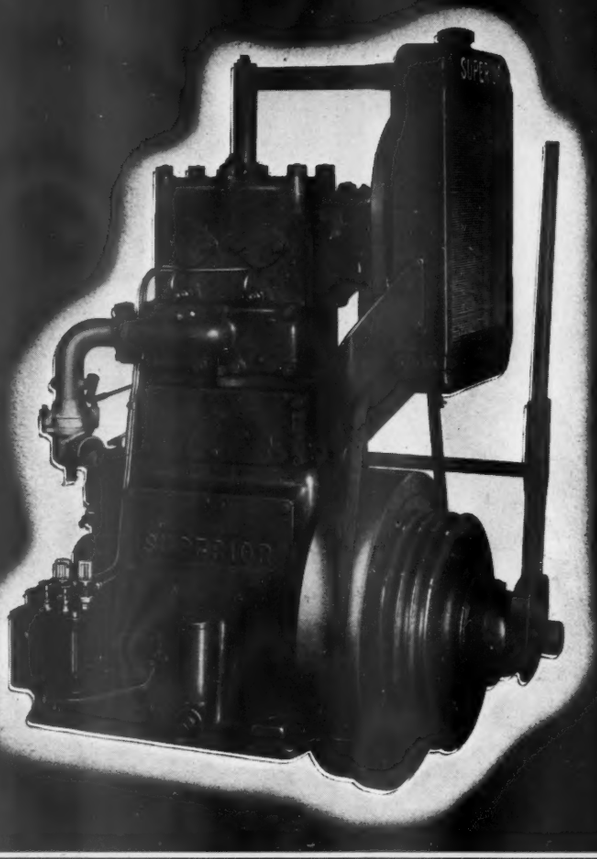

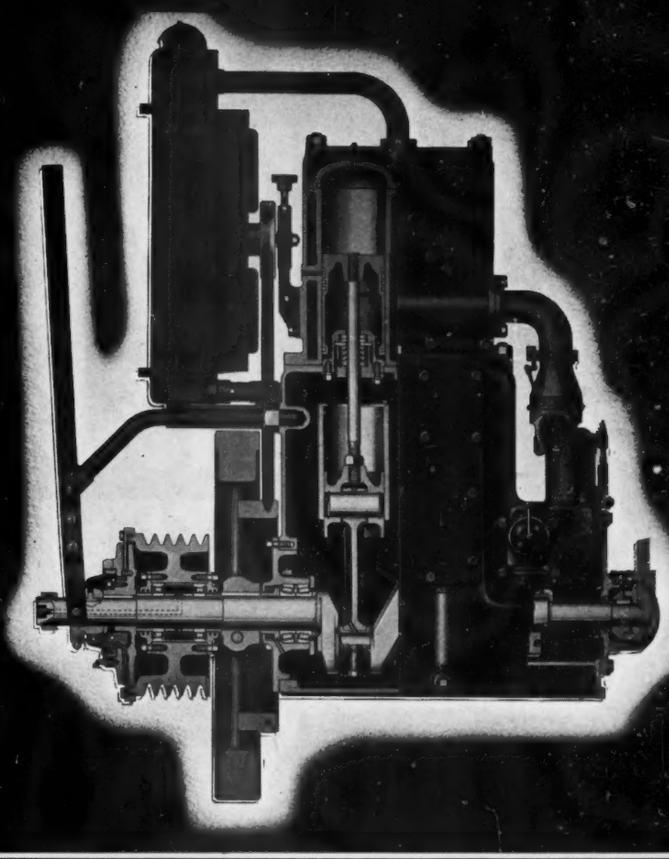

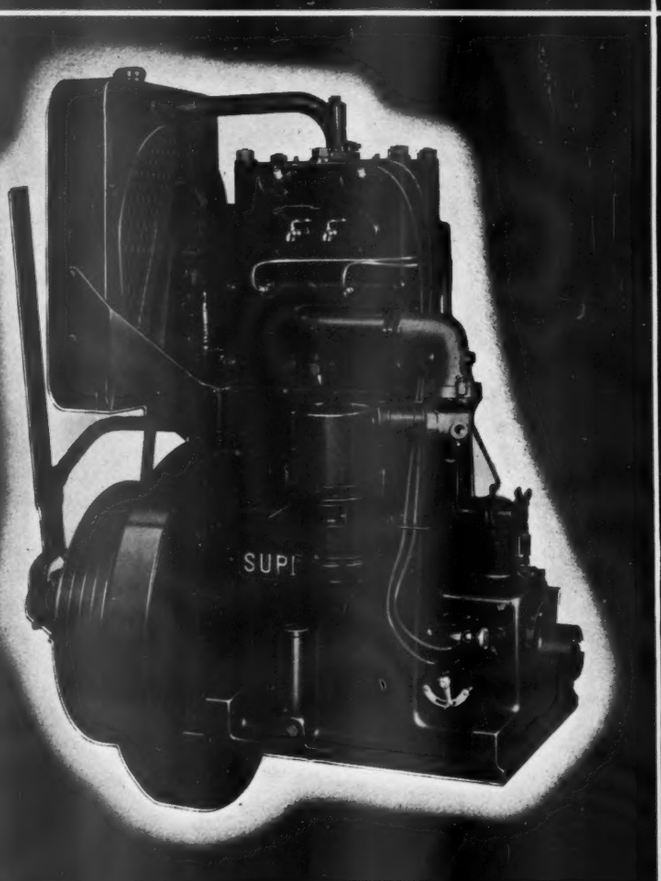

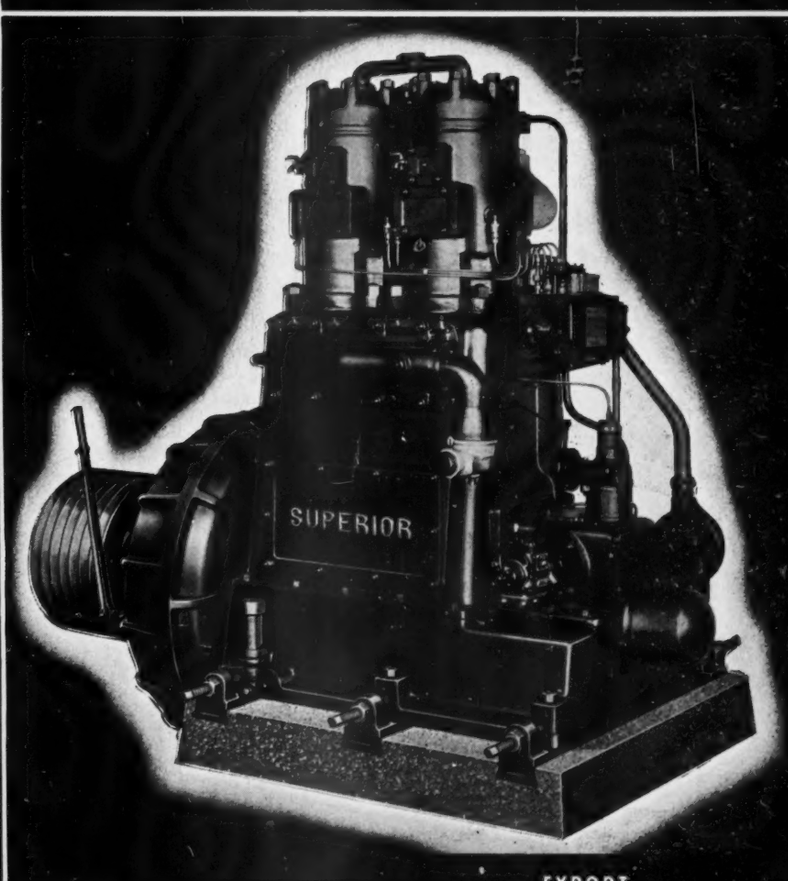

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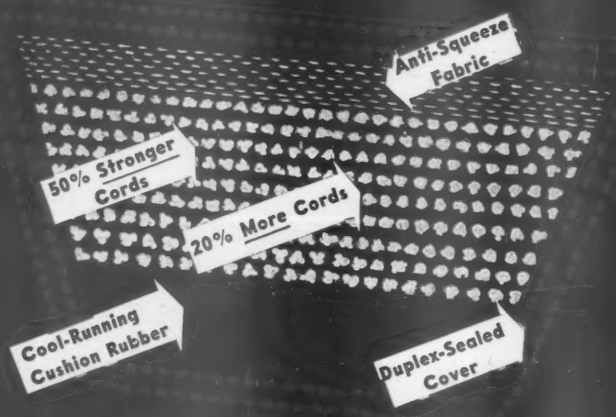

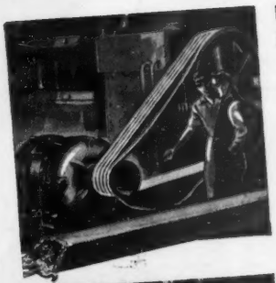

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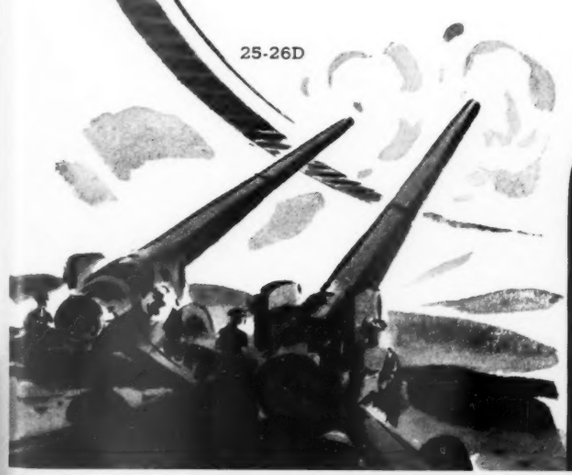

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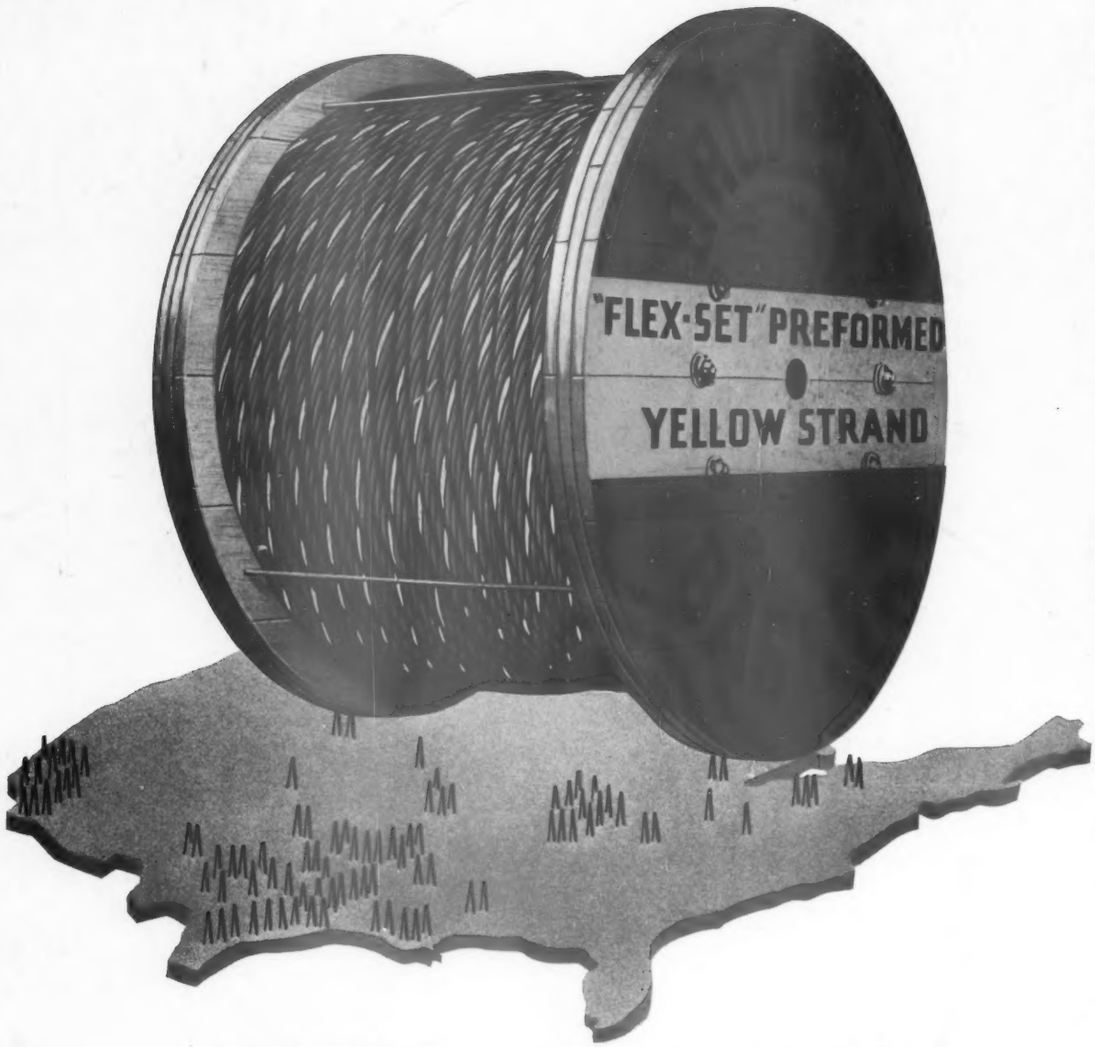

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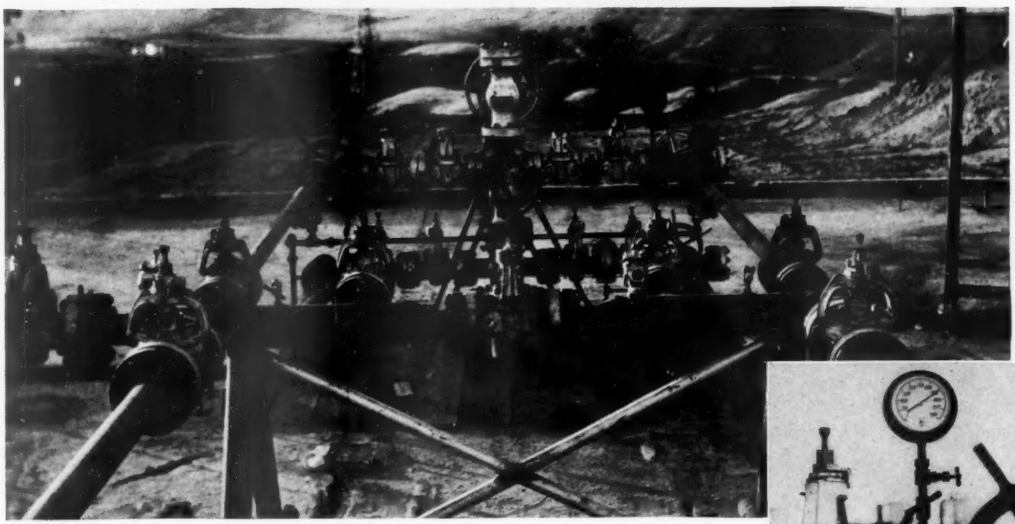

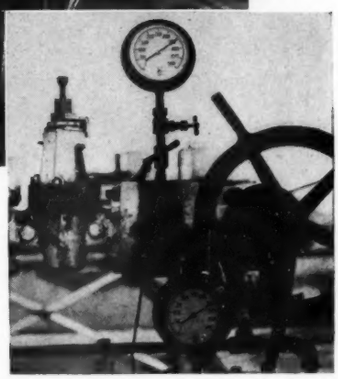

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There's the STAINLESS STEEL WELDING ELECTRODE YOU WANT"

● It's listed on page 6 of this booklet on Stainless Steel Welding and Electrodes that has been prepared by PAGE.

●

You probably know as well as we do that you must look for and insist on getting two distinctly different *kinds* of quality in your Stainless Steel Electrodes.

It is imperative for good Stainless Steel Welding that the deposit *in the weld* be equal to the Stainless Steel you are welding.

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Cities Service Sealed Lubrication Ride Improver Service, illustrated here, provides a good case in point. You know how much wear dirt in a lubricant can cause to auto parts. And Sealed Lubrication, by keeping grease fresh and *clean*, eliminates that cause of wear and helps keep the car at its youthful best. Thus, the longer its owner can make it last, the lighter the load on automobile manufacturers now bearing the brunt of defense production.

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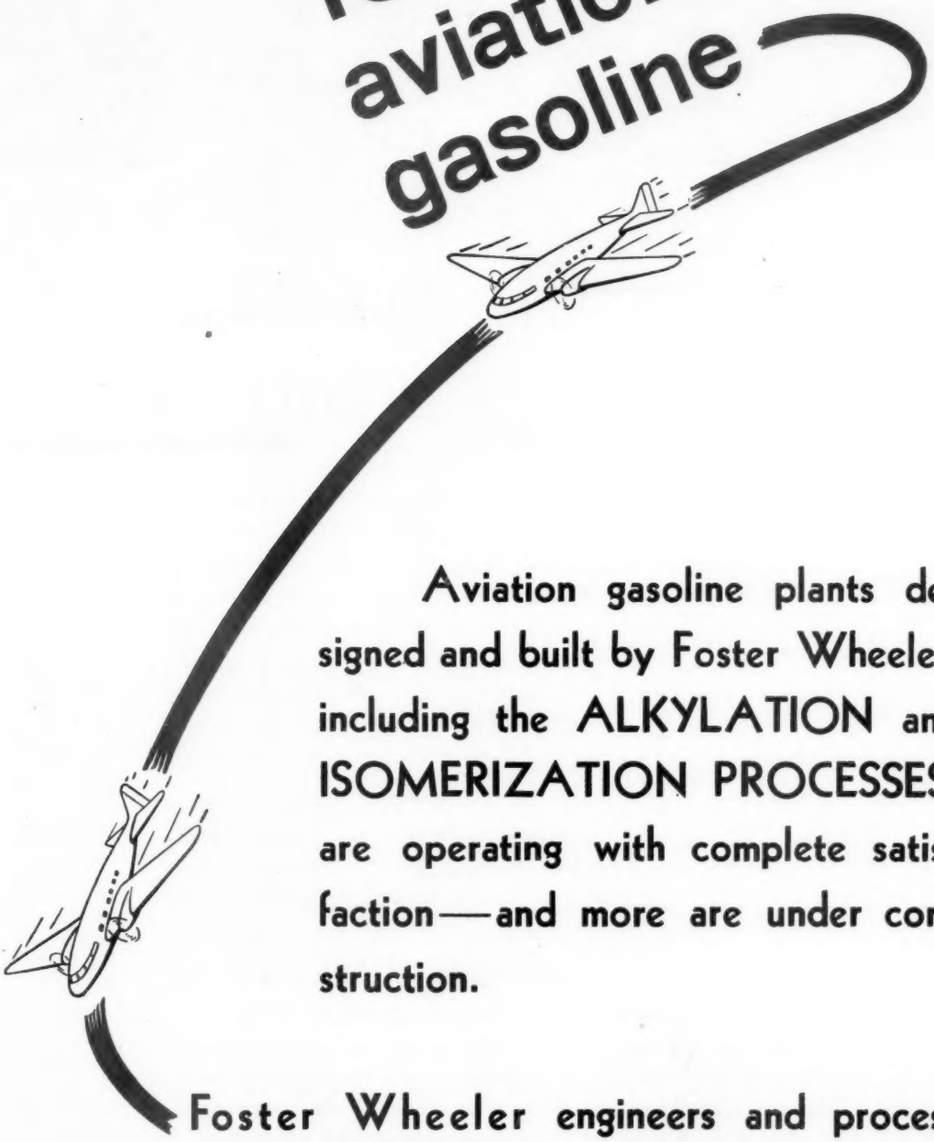

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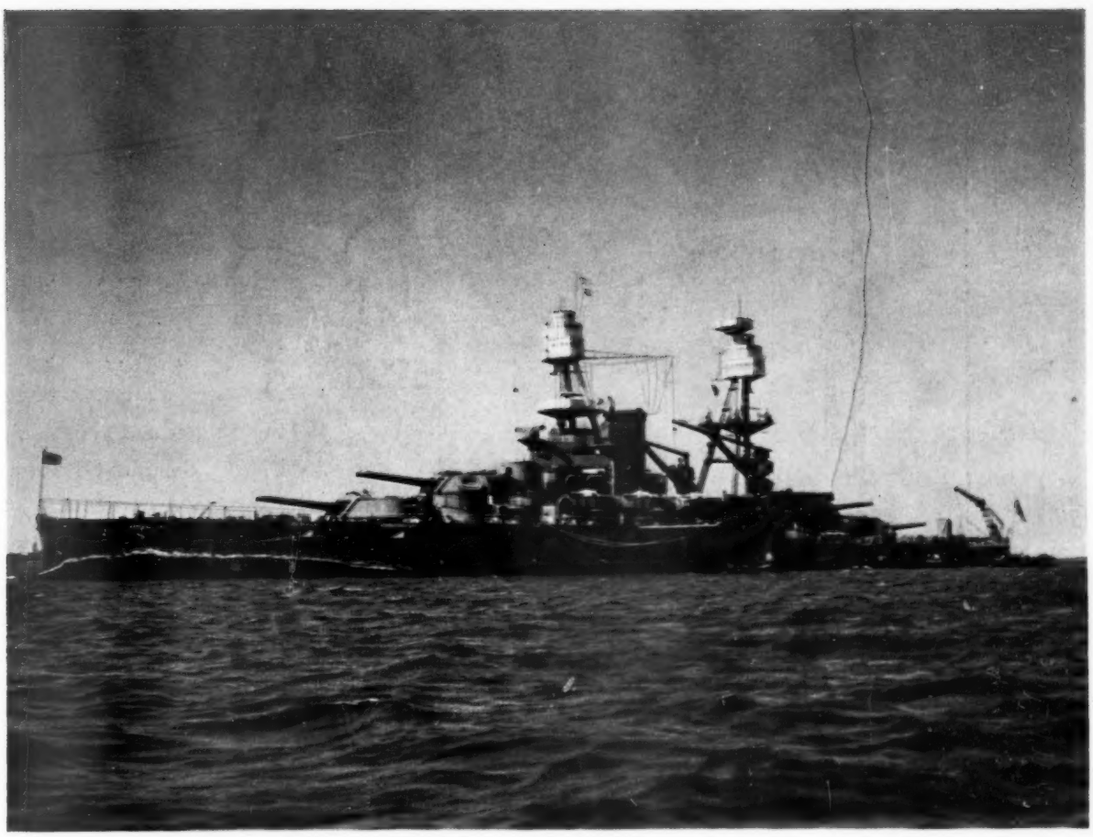

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Whether on the sea or under ground . . .
balanced design makes a powerful weapon

Battleships are the "floating forts" of a fleet. They are designed to combine maximum protective armor with heaviest fire-power . . . a correct balance between massive strength and necessary mobility . . . .

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Hughes Tool Co. Houston, Texas

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Benefits Your Customer...

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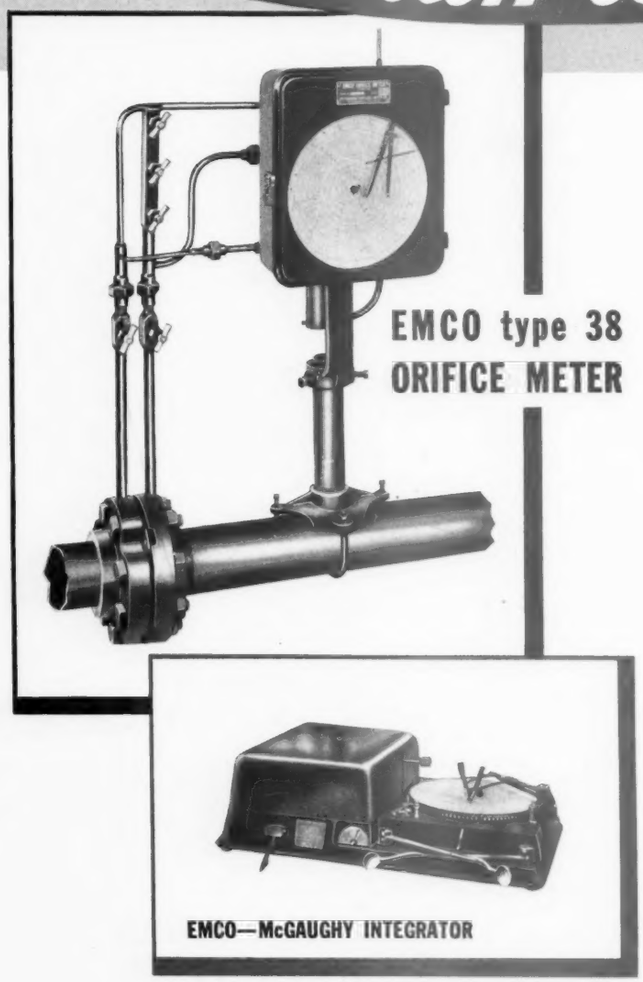

EMCO type 38 ORIFICE METER

EMCO—McGAUGHY INTEGRATOR

CUSTOMER confidence is a priceless asset that can be enhanced by the use of good equipment. The EMCO Type 38 Orifice Meter not only meets with the approval of those responsible for measurement, but also of those whose position it is to keep maintenance at a minimum and performance at a maximum. Consumers appreciate the ruggedness, simplicity and accuracy of the EMCO design. Of particular importance is the confidence instilled by the use of the EMCO-McGaughy Integrator for the mechanical calculation of charts. Machine precision, as against the possibility of human error in the inspection method removes doubt as to accuracy from the customer's mind. With the EMCO System of Measurement by Orifice, your consumers are assured of accuracy in measurement and calculation, from the field to the final accounting and billing.

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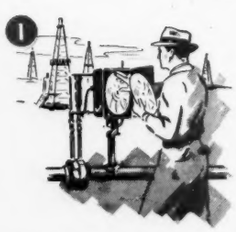
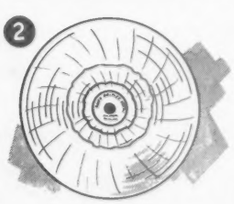
HERE'S THE EMCO SYSTEM OF ORIFICE METER MEASUREMENT

1. 

THE EMCO TYPE 38 ORIFICE METER in the field accurately records the static and differential pressures and produces . . .

2. 

CLEAR, LEGIBLE CHARTS that are quickly and accurately calculated by . . .

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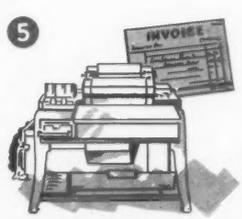
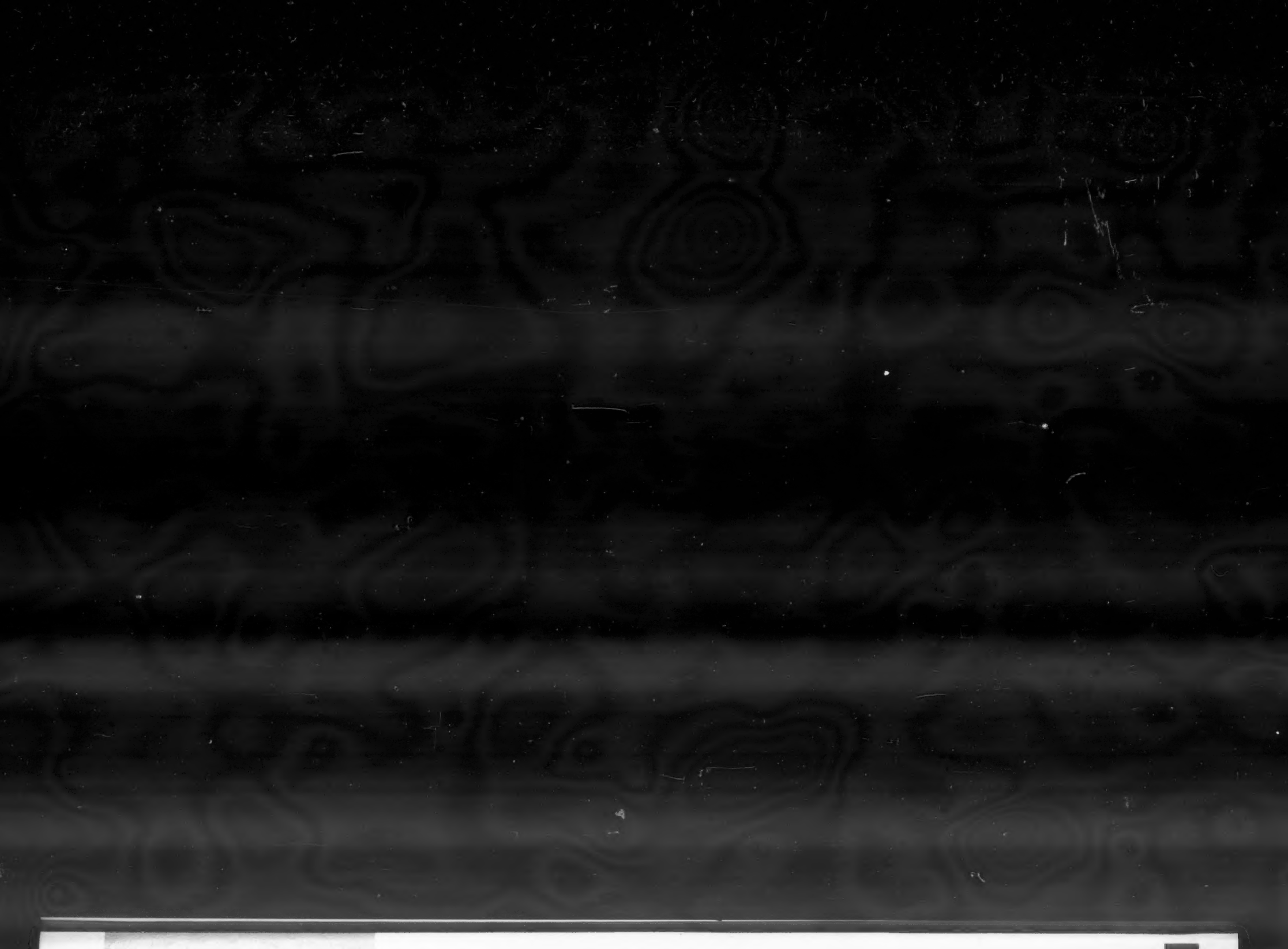
THE EMCO-McGAUGHY INTEGRATOR in the office. The integrator automatically and accurately calculates the total extension of the charts with perfect accuracy and turns over to the . . .

4.

ACCOUNTING DEPARTMENT a record of the gas used by each customer. These records are transferred for . . .

5. 

BILLING by an Alphabetical Accounting Machine (such as made by IBM) which automatically calculates and bills by mechanical methods . . .